NETWORK WORLD
The Newsweekly of User Networking Strategies

Volume 7, Number 49 | An International Data Group Publication | December 3, 1990

MAP/TOP group charts new course

By Ellen Messmer
Washington Correspondent

HERNDON, Va. — Leaders of the North American MAP/TOP Users Group last week said the group has completed the basic work of defining network standards and will shift its focus to promoting MAP and formulating transition strategies to Open Systems Interconnection.

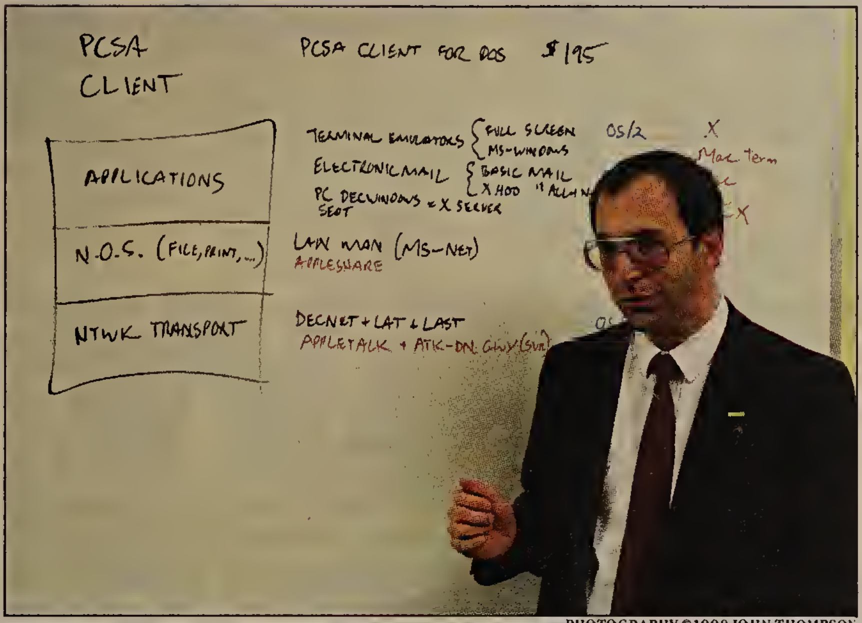
"We've been very technology-oriented, [but] the new priority is to raise awareness of the strategic nature of OSI at the CEO level," said Laurie Bride, manager of network architecture at Boeing Computer Services Co. and a member of the MAP/TOP group.

Bride made her remarks at the Fall Users Group Conference sponsored by MAP/TOP and the National Institute of Standards and Technology.

The Manufacturing Automation Protocol and Technical and Office Protocol standards are profiles of the OSI network model and are intended to simplify the creation of open systems networks. The MAP/TOP Users Group is part of the Corporation for Open Systems International.

Bride told conference attendees that a supplement to MAP scheduled to be released next spring will be the most robust

(continued on page 70)



PHOTOGRAPHY ©1990 JOHN THOMPSON

DEC's Robert Nusbaum explains PCSA client software strategy.

DEC official details efforts to weave PCs into DECnet

By Charles Bruno
Assistant Managing Editor

LITTLETON, Mass. — Although Digital Equipment Corp. has been criticized for being slow to acknowledge the role of personal computers in corporate networks, the company has come a long way in the past year in supporting microcomputers within DECnet.

In a recent interview with *Network World,* Robert Nusbaum, strategic marketing manager in DEC's Personal Computing Systems Group here, said the company has worked diligently to provide stand-alone and local-area network-based personal computers with the same privileges granted to DECstations and VT terminals in DECnet environments.

"PCs are a fact of life," Nusbaum said. "They're out there, and they're not going to go away. The breadth of our vision is to integrate PCs not just on a local level, but to provide the resources so they can access common data bases and applications across the entire company."

Analysts note, however, that DEC has yet to offer a general-purpose LAN server based on Intel Corp. microprocessors for DOS and OS/2, a sign that it is reluctant to encourage customers to migrate in that direction.

"The fact that DEC is moving very slowly in this direction is evi-

(continued on page 8)

US Sprint to serve up inband ANI feature

New offering will give users of Ultra 800 service a less expensive alternative to ISDN-based ANI.

By Bob Wallace
Senior Editor

WASHINGTON, D.C. — Bowing to pressure from 800 service customers that don't want to invest in ISDN, US Sprint Communications Co. this week is expected to tariff an inband automatic number identification (ANI) feature for its high-end toll-free service.

The feature, dubbed In-Band Real Time ANI, has been in beta test and will be available immediately for Ultra 800 service users with dedicated access to US Sprint's net. It will eventually be offered with US Sprint's other dedicated access 800 services.

The option works with Rockwell International, Inc.'s Switching Systems Division automatic call distributors, as well as Northern Telecom, Inc. and Rolm Co. private branch exchanges, but users must modify AT&T PBXs to take advantage of the capability.

Inband ANI, which is also offered by MCI Communications Corp., gives 800 service users a less expensive alternative to ANI via the Integrated Services Digital Network Primary Rate Interface (PRI). Those services use out-of-band signaling to deliver ANI.

MCI says 50 customers are currently using its inband ANI.

Large US Sprint customers, including Sears Technology Services, Inc., pressed the carrier for the inband ANI capability.

"Inband ANI was a feature we had to have and something that

chart B, 4-color, page 1

(continued on page 67)

Why can't modems work together?

See story, page 49.

RBHCs pump big bucks into U.K. nets

By Barton Crockett
Senior Editor

LONDON — Betting they can prosper in a competitive environment, five regional Bell holding companies are planning to spend billions of dollars to build local telecommunications facilities in the U.K.

The foreign investments represent what some observers say is a flight of capital, the result of stringent U.S. regulations that make it more attractive for the RBHCs to invest in operations abroad rather than pump money back into domestic facilities.

According to the U.K.'s Office of Telecommunications, every RBHC except BellSouth Corp. and Bell Atlantic Corp. is entering the U.K. market by purchasing major stakes in start-up cable television franchises. Over the next few years, the RBHCs and their part-

(continued on page 70)

NETLINE

▲▲▲

INFONET MAKES HEADWAY in effort to build global network of EDI providers. Page 2.

USERS IMPRESSED WITH IBM LAN Server's ability to link work groups into host environments. Page 2.

3COM, IBM DELIVER their specification to ease management of mixed LAN environments. Page 2.

WORKERS FAIL TO GAIN injunction to block utility's outsourcing decision but draw attention to issues. Page 4.

MARTIN MARIETTA SIGNS $525.9m IS contract with HUD following 2½-year bidding process. Page 4.

NETWORK VETERAN John Macri reflects on his 50 years in the industry. Page 71.

NEWSPAPER

FEATURE

▲▲▲

Transforming LANs into virtual supercomputers

Trends and Technologies RESHAPING networks:

By James Kobielus
Special to Network World

In the next 10 years, the virtual supercomputer — drawing life from spare machine cycles on LAN-attached computers — could be a reality in many workplaces.

page 1

Parallel computing architectures could make local-area networks the most cost-effective platform for high-performance computing applications such as on-line transaction processing, real-time graphics and video interaction. In the near future, however, parallel LAN supercomputing will appeal to a "niche market" of scientists and engineers, the traditional users of supercomputing applications, according to Howard Frank, chairman of Network Management, Inc., a major LAN/wide-area network integrator in Fairfax, Va.

This CPU-brokering activity

(continued on page 38)

Infonet one step closer to building a global EDI net

Forges its first interconnection for Railinc, enabling the U.S. firm to send messages to partners abroad.

By Bob Brown
Senior Editor

BOSTON — Infonet Services Corp. last week said it has made significant progress in its plan to build a global electronic data interchange network.

A year ago, Infonet formed an alliance with national EDI service providers from five countries that agreed to link their networks through Infonet's worldwide value-added net. Their mission was to offer users a simple, cost-efficient way to send EDI messages to trading partners overseas.

In an interview here last week, Infonet officials said the company has forged its first actual network interconnection with an alliance member, Railinc Corp., a Washington, D.C. organization that provides EDI services to railroad companies and their customers. The interconnection will enable Railinc users, who are primarily in the U.S., to send messages to trading partners abroad.

In addition to the interconnection of the Railinc and Infonet networks, Infonet announced new members of its global EDI alliance: Ireland's PostGEM, PTT Netherlands, Swedish Telecom International and Switzerland's Swisscos AG.

The original members of the EDI alliance are Railinc, Singapore Network Services, Telecom

(continued on page 67)

IBM's LAN Server gets high marks for performance

Users also praise host connectivity capabilities.

By Tom Smith
Senior Writer

Users of IBM's LAN Server network operating system give the product high marks for performance and for its ability to tie personal computer work groups to IBM hosts.

Customers are deploying LAN Server to support local-area network-based client/server applications such as data bases and to provide workstation users with access to hosts for applications including electronic mail, and financial reporting and analysis.

But despite their overall satisfaction with the product, users said the network operating system needs enhancements, particularly in the area of shared printing capabilities.

Brigham and Women's Hospital in Boston is planning to use LAN Server throughout a hospitalwide IBM Token-Ring LAN that will eventually support over 2,000 IBM Personal Computers.

Robert Beckley, director of technology planning at the hospital, said he has been pleasantly surprised by the performance of the operating system. The hospital has undertaken rigorous testing of LAN Server supporting a data base application.

"We've stressed it fairly heavily," Beckley said. "The performance is excellent."

(continued on page 66)

IBM, 3Com release spec for local network management

By Tom Smith
Senior Writer

SANTA CLARA, Calif. — IBM and 3Com Corp. last week announced availability of their previously announced local-area network management specification for mixed Ethernet and token-ring environments.

Vendors can now receive copies of the Heterogeneous LAN Management (HLM) specification, which has already been distributed to four major operating system vendors for comments and suggestions.

HLM defines an application program interface that vendors can use to create net management systems capable of controlling internetworked Ethernet and token-ring LANs from a single workstation.

HLM is based on a subset of the Open Systems Interconnection Common Management Information Protocol (CMIP), but it addresses only the bottom two layers of the OSI model, whereas CMIP addresses all seven.

"Anything that provides some base level of interoperability upon which vendors can add value is a very good thing," said Jeremy Frank, a vice-president at Gartner Group, Inc., a consulting firm in Stamford, Conn.

(continued on page 6)

Briefs

AT&T plans deeper cuts. AT&T last week confirmed that, in 1991, it will cut 3,000 technicians from its Network Services Division and close 13 Business Special Service offices, which install, test and maintain private lines. Private-line service duties will be picked up by 12 other service centers around the country. An AT&T spokesman said the company needs fewer people to handle service because increased use of digital facilities has reduced the number of trouble calls and new software allows greater control over the net from remote locations.

The cuts, which will come from both management and nonmanagement personnel, represent about 10% of the work force at the Network Services Division, which is part of AT&T's Business Communications Services unit. Some employees may be shifted to other divisions.

Microsoft lures Banyan exec. James Allchin, senior vice-president at Banyan Systems, Inc., is leaving the local-area network company for an executive position in the Network Business Unit of Microsoft Corp. in Redmond, Wash. Microsoft said Allchin will most likely be general manager of LAN products, which will entail development and testing of products such as OS/2 LAN Manager and SQL Server.

One longtime user of VINES, the company's Unix-based network operating system, said Allchin's departure is not cause for concern. "In the early days, when VINES was Jim Allchin, it would have been a major blow," said Larry Stouder, manager of technical development at Continental Grain Co. in New York. "But now VINES is evolving through the contributions of many talented people that I respect highly."

Banyan said Allchin made the move for personal reasons. Since Allchin's position will not be filled, the two groups that previously reported to him will now report directly to Rodger Weismann, the company's chief operating officer.

Vendors back multimedia effort. IBM and other leading personal computer vendors last week endorsed Microsoft Corp.'s approach to multimedia computing. IBM said it agreed to work with Microsoft to add multimedia support to personal computer operating systems. The vendor also said it will work on adding that feature to OS/2, while Microsoft will work on adding the feature to its DOS-based Microsoft Windows product. Other computer companies, including AT&T, Tandy Corp. and Group Bull S.A.'s Zenith Data Systems, said they would use the multimedia version of Windows to introduce personal computers with built-in CDROMs.

COS eyes OSInet. The Corporation for Open Systems International (COS) is negotiating to take over administration of OSInet, the National Institute of Standards and Technology (NIST) research and development X.25 packet-switched network used by corporations and the government to test Open Systems Interconnection products. Officials at NIST are interested in shifting management of the network to private industry because of the growing commercialization of OSI.

Steve Hudson, executive vice-president and chief operating officer for COS, said discussions with NIST determined that OSInet operational costs, paid for by the roughly 20 OSInet corporate and government members, reach $300,000 annually.

Separately, Hudson said COS next year will likely expand its mission to include a requirements interest group for customer premises equipment and conformance testing for the Fiber Distributed Data Interface.

States rule on caller ID. The state of Maryland's Public Service Commission (PSC) recently voted by a 4-to-1 margin to require carriers to provide free call blocking with caller identification services. "There are possible negative effects of caller ID service that warrant and justify the implementation of caller ID blocking," the PSC said.

Meanwhile, in South Carolina, a court declared caller ID legal and ruled it does not violate the state's wiretap laws.

Northern Telecom readies for quake. Northern Telecom, Inc. last week said it is standing by in Tulsa, Okla., with more than $2 million of switching equipment to help telephone companies restore service in the event an earthquake strikes along the New Madrid fault line in Missouri. Should a quake of the magnitude predicted by experts rock Missouri and surrounding states this week, Northern Telecom said it will deploy equipment to the most severely affected areas.

CONTENTS

Industry Update

Retix to make mark on end-user market. **9**
UB/ACC deal to add routing capabilities to Access/One. **9**

Telecommunications

AT&T to phase out monthly MLW plan. **13**
Nynex attacks foes seeking to reopen overcharge case. **13**

Data Communications

Nations argue merits of Group IIIbis fax. **15**

Local Networking

3Com offers LAT support with TCP/IP software. **21**

Management Strategies

Reporting structures evolve with networks. **25**
Hospital network offers wide access to patient data base. **25**

International

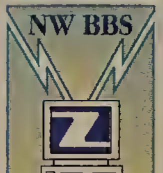
Carriers dispute FCC plan to set int'l rates. **29**
German two-way satellite market opens to competition. **29**

Products & Services

Memorex Telex rolls out remote controller. **33**
Momentum unveils XIPC tools for net applications. **33**

Opinions

Australia's TeLinc faces status as worldwide standard. **34**
LAN administrators need direction as well as training. **35**
Action Center 59
Networking Marketplace 62
Networking Careers 62
Resource Directory 63



NW Bulletin Board Contact us electronically. Our BBS lets you submit letters to the editor, pass on tips and leave change of address requests. It is also a forum for interaction with other readers.

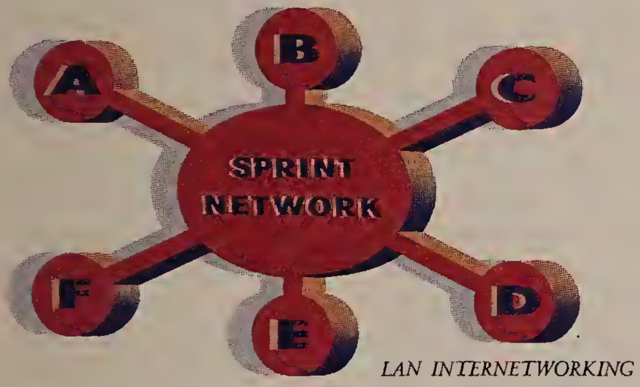
Use your IBM, Apple or other microcomputer to reach the BBS at 300 to 2,400 bit/sec (8N1) by dialing 508-620-1160, or 508-620-1175, or at speeds up to 9.6K bit/sec by dialing 508-620-1178. You can also reach us in person by calling 800-622-1108.

Article reprints (minimum 500 copies) can be obtained from Donna Kirkey, Network World, Inc., 161 Worcester Road, Framingham, Mass. 01701-9171; (508) 875-6400.

1984 *Sprint begins construction of the first and only coast-to-coast digital fiber optic network.* 1985 *Sprint introduces the world's first virtual network.* 1986 *First transcontinental videoconference call transmitted by Sprint.* 1987 *Eight million FÖNCARDs distributed in first year of introduction.*

A VPN IS A TERRIBLE THING TO WASTE.

IF YOU'RE ONE OF OUR MULTI-LOCATION CUSTOMERS, chances are you have our VPN℠ service. There's also a good chance you're only using a fraction of its real potential.

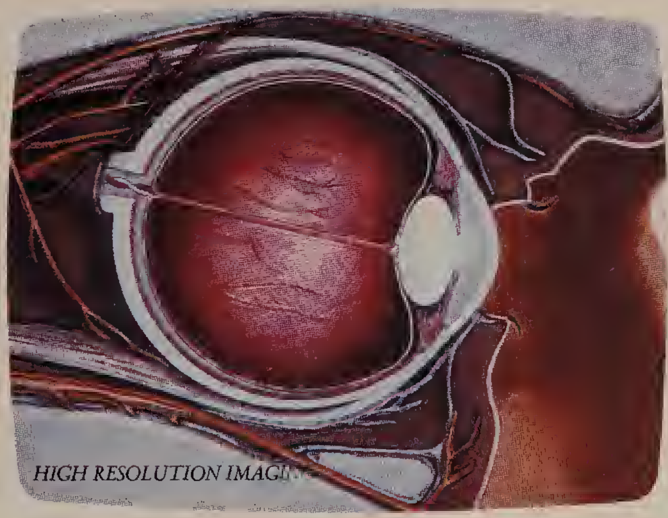


LAN INTERNETWORKING

Of course, VPN is the ideal medium for a whole spectrum of high-end applications. Because it handles data as routinely as voice. And operates nationwide. As well as throughout Canada, the U.K., and Hong Kong.

VIDEO CONFERENCING

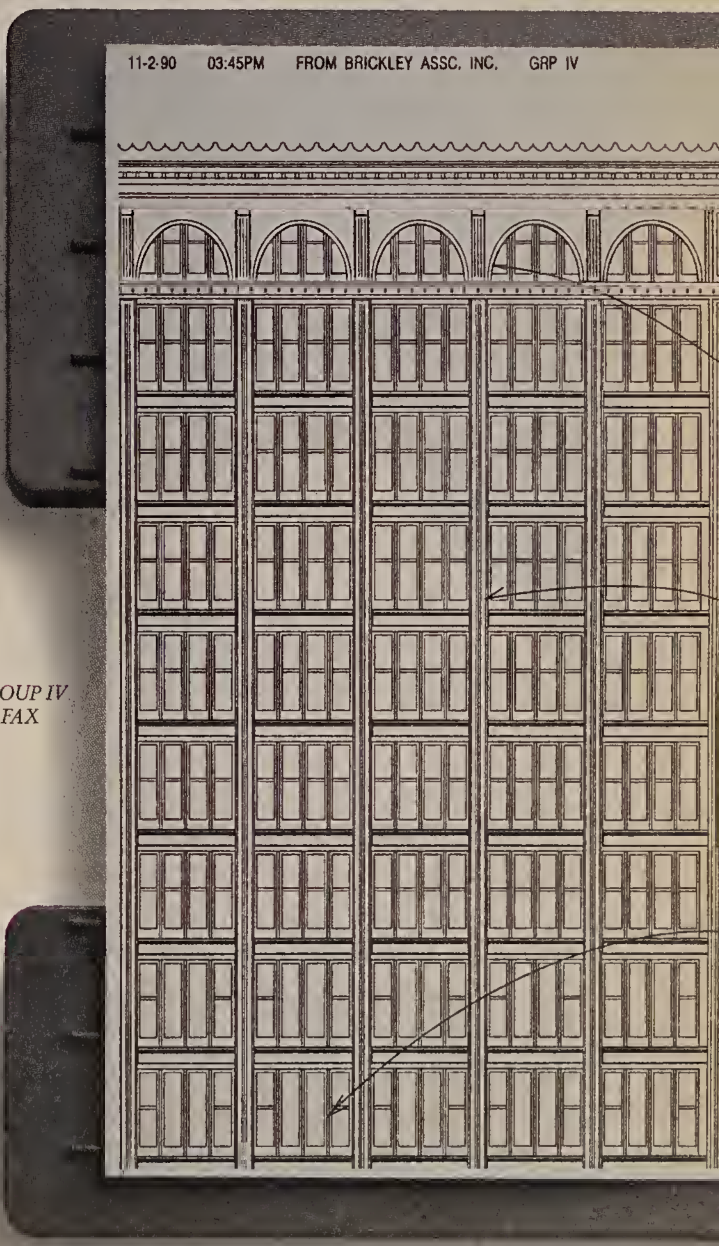
And now, you can choose the digital access you need: T1 Partitioning or ISDN PRI. Plus LEC 56 in selected areas. Which opens up a whole new world of possibilities.



For example, you can send high-resolution images that are accurate enough to verify circuit board designs. And fax the whole image for the price of a 12-second phone call. Or bundle circuits for high-bandwidth applications like interactive CAD/CAM.

You can also transfer huge files between LAN networks in high-speed bursts. And with the VPN/Meeting Channel Gateway,℠ you can get the ultimate in video flexibility. Over 800 locations for full motion video in over 25 countries. You can even bring smaller sites on-line cost-effectively, at 112 KBPS.

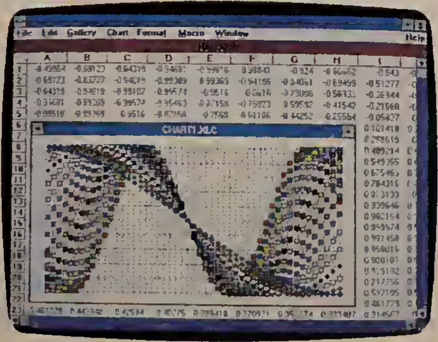
If you'd like to know more, just ask your Sprint account team. Or call us at 1-800-877-1918. We'll have full information in your fax machine in only a few minutes. And show you how to take advantage of VPN's full potential.



GROUP IV FAX

Because we think a VPN is a terrible thing to waste. Almost as much as the competitive edge it can give you.

ISDN/VPN INTERNETWORKING



BULK FILE TRANSFER

INTERACTIVE CAD/CAM

US Sprint.
IT'S A NEW WORLD℠

© 1990 US Sprint Communications Company Limited Partnership

1988 *Sprint awarded 40% of FTS 2000 contract.* 1989 *Sprint completes the world's first and largest privately-owned transatlantic fiber optic cable.* 1990 *Sprint provides the world's most extensive public data and videoconferencing networks.*

Workers wage war against outsourcing by filing suit

Move points out growing employee uneasiness.

By Wayne Eckerson
Senior Editor

NASHVILLE — A lawsuit filed by employees of Nashville Electric Service (NES) to block the company from handing over information systems (IS) operations to an outside firm shows just how far disgruntled workers will go to fight outsourcing.

Analysts and net managers agreed that the suit doesn't represent the start of a worker's revolt against outsourcing. But they said it illustrates growing employee concern about outsourcing and job security — concern fueled by the current economic downturn.

They added that the suit reemphasizes the need for companies to address the personal and professional needs of employees whose jobs are affected by an outsourcing decision.

Last week, an NES employee association failed to win a court injunction blocking the utility from finalizing a seven-year $40 million contract to outsource its data processing operations to Seltmann, Cobb and Bryant, Inc., a Memphis, Tenn.-based software development firm.

The contract, which was announced in mid-October and went into effect Dec. 1, involves the transfer of all 43 members of NES' IS staff to Seltmann, Cobb's payroll.

Despite the setback, employees are pressing ahead with their suit. The action charges NES with violating its own charter, which stipulates that job transfers and layoffs be based on performance and seniority, according to Aleta Arthur Trauger, an attorney representing the association.

The lawsuit also charges that NES, the eighth largest public utility company in the U.S., violated its own purchasing policies by failing to put the contract out for public bid and failing to hold public meetings as required by Tennessee open meeting laws, Trauger said.

According to an NES spokeswoman, IS workers have been offered jobs at Seltmann, Cobb at salary and benefit levels equal to or greater than their current levels.

NES is working with each IS employee on the exact terms of transfer, she said.

Despite mounting legal fees and a host of negative publicity, NES is pushing ahead with the outsourcing deal.

"The [utility] board believes this was a good business decision that will save ratepayers $16 million over the next seven years," the spokeswoman said. "The board has made every effort to be as fair as possible to all employees involved."

Ken McGee, project manager for Gartner Group, Inc., a research firm in Stamford, Conn., said the downturn in the economy may be making workers more anxious when faced with an outsourcing decision and perhaps quicker to redress their grievances through the courts.

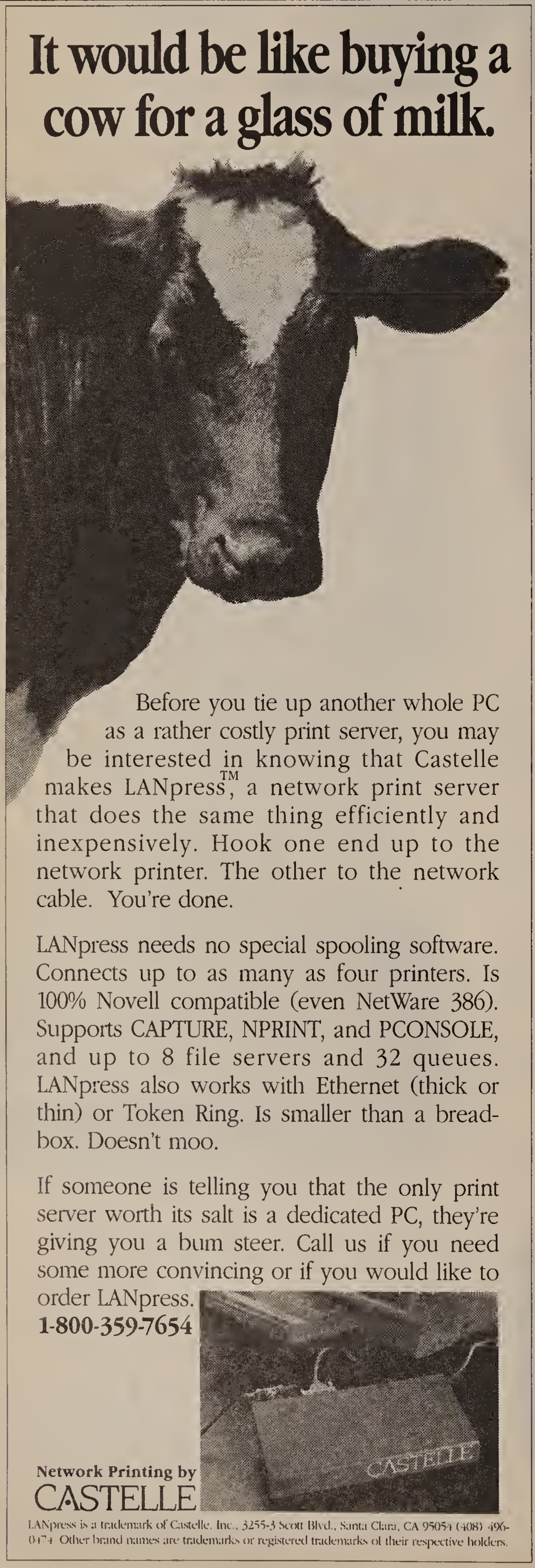
"People may be clinging to their jobs for understandable reasons," McGee said.

But analysts also said the suit underscores the potential explosiveness of outsourcing decisions if employee issues are not carefully managed.

To avoid a crisis, companies need to engage in detailed planning and then communicate information about benefits, salaries and job levels to each affected individual as quickly as possible to allay anxieties and keep morale from plummeting.

"The process of transferring employees as part of an outsourcing arrangement requires excep-

(continued on page 70)



It would be like buying a cow for a glass of milk.

Before you tie up another whole PC as a rather costly print server, you may be interested in knowing that Castelle makes LANpress™, a network print server that does the same thing efficiently and inexpensively. Hook one end up to the network printer. The other to the network cable. You're done.

LANpress needs no special spooling software. Connects up to as many as four printers. Is 100% Novell compatible (even NetWare 386). Supports CAPTURE, NPRINT, and PCONSOLE, and up to 8 file servers and 32 queues. LANpress also works with Ethernet (thick or thin) or Token Ring. Is smaller than a breadbox. Doesn't moo.

If someone is telling you that the only print server worth its salt is a dedicated PC, they're giving you a bum steer. Call us if you need some more convincing or if you would like to order LANpress.
1-800-359-7654

Network Printing by
CASTELLE

LANpress is a trademark of Castelle, Inc., 3255-3 Scott Blvd., Santa Clara, CA 95054 (408) 496-0474 Other brand names are trademarks or registered trademarks of their respective holders.

Martin Marietta wins bid for $525.9m HUD contract

By Paul Desmond
Senior Editor

WASHINGTON, D.C. — The U.S. Department of Housing and Urban Development (HUD) last week awarded Martin Marietta Corp. a $525.9 million contract to upgrade its information systems, which includes the merger of two data nets and the installation of 250 LANs.

Martin Marietta will install a 30-node Netrix Corp. T-1 backbone to link 81 HUD field and regional offices to its headquarters here and to a new data center in Lanham, Md. The data center will be outfitted with new Unisys Corp. mainframes as well as Hitachi Data Systems Corp. IBM-compatible hosts, while some 250 Novell, Inc. NetWare local-area networks will be installed in HUD offices across the country.

The award caps a 2½-year bidding process during which Martin Marietta spent more than $10 million to outduel rivals Boeing Computer Services Co. and Electronic Data Systems Corp. (EDS) for the 12-year HUD Integrated Information Processing Service (HIIPS) contract.

For HUD, the contract will mean "a more modern operating environment, in terms of both a new data center and a more modern net," said Don Demitros, director of information policy and systems for HUD. "And it replaces some of the problem parts of our current environment, which [include] two incompatible networks."

He said Martin Marietta was selected because "they provided the lowest cost proposal and their technical proposal scored the highest."

Martin Marietta will build the T-1 backbone, install the LANs, upgrade the mainframes and install various other net equipment over the next 30 months, said Peter Bracken, a Martin Marietta vice-president and its program manager for HIIPS.

Circuits provided under the Federal Telecommunications System (FTS) 2000 contract will be used for both the T-1 backbone and lower speed lines that link the 81 sites to the backbone, but the cost of those circuits is not included in the $525.9 million price tag for the contract, Bracken said. About 60% of that cost is for labor, including designing, planning, managing and building the network, Bracken said. The other 40% is for hardware, software and maintenance.

Two existing data nets — one a network of leased lines and the other supported over the Sprint Data Group public packet net — will be migrated onto the new T-1 backbone. The nets support different applications but run in parallel to the same 81 HUD offices.

Some 60 to 80 Novell LANs are already installed in HUD offices, Bracken said, but they will be replaced over the next 30 months with new LANs and about 6,500 AMAX Engineering Corp. workstations based on Intel Corp. 80286 or more powerful microprocessors. Altogether, more than 50,000 AMAX workstations will be installed during the life of the contract, Bracken said.

Megacom users gain wider reach

By Bob Wallace
Senior Editor

BASKING RIDGE, N.J. — AT&T last week announced services that let Megacom 800 users in the U.S. receive calls from customers in 53 additional countries using existing access facilities.

The new offerings — Megacom 800 Service-Overseas and Megacom 800 Service-Mexico — are scheduled to become available Jan. 5 and will greatly expand the reach of the high-end toll-free service.

Megacom 800 users with T-1 access can receive calls from Australia, France, Germany, Ireland, Israel, Japan, Korea, Netherlands, Spain and the U.K., as well as 42 other nations, using Megacom 800 Service-Overseas. Previously, Megacom 800 users could only receive calls from Canada.

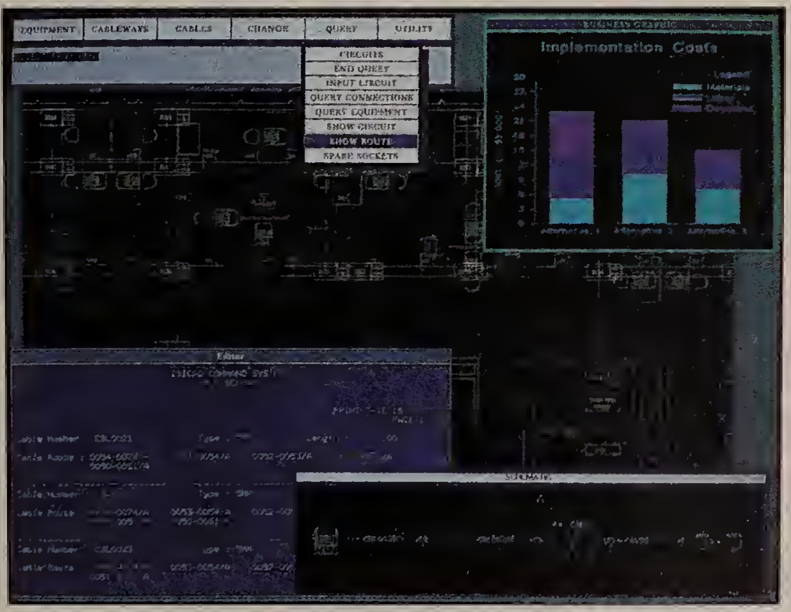
AT&T 800 users that already receive toll-free calls from the 53 nations can move to the higher end Megacom 800 and pay lower rates for calls from abroad.

For example, for calls from Australia, an AT&T 800 user pays $81 an hour for the first 10 hours, $75 an hour for the next 25 hours and $69 an hour for over 35 hours. By comparison, a user that upgrades to Megacom 800 Service-Overseas pays $77 an hour for the first 10 hours, $71 for the next 25 hours and $65 an hour for over 35 hours.

If total monthly usage under Megacom 800 Service-Overseas and Megacom 800 Service-Mexico exceed $10,000, additional usage up to $30,000 is discounted by 10%. Usage over $30,000 is discounted 15%.

To promote the two new Megacom 800 services, AT&T has waived the $1,090 installation charge and the $20.50-per-country charge for customers that order service before March 31, 1991, for installation before May 31, 1991.

It's Time To Take COMMAND.™



COMMAND is a minute-by-minute living record of your communications environment.

Look above your ceiling. Check out your telecom closet. It's a nightmare.

Cables and wires run everywhere (and nowhere) without a clue to their connections. Your investment is enormous–and getting bigger. If disaster strikes, there is no way to recover quickly.

Solve Your Cable Management Problem.

Finally, there's a solution. COMMAND is the first *real* cable and communications design and management system–complete with graphics tightly integrated with a comprehensive database. You can actually *see* your entire premises wiring and communications environment.

For any size system, you can design your premises wiring and manage moves, adds and changes–voice, data or video. When you make a change to the drawings, the database updates instantly and vice versa. Plus, all your work orders, bills of materials and schematics can be generated automatically–man-years of savings!

Stop Hiding Your Profits In The Ceiling.

Take COMMAND–Call today for complete information to:
(800) 556-1234, ext. 281-B, or
(800) 441-2345, ext. 281-B
in California.

ISICAD, Inc., 1920 West Corporate Way, P.O. Box 61022, Anaheim, CA 92803-6122.

ISICAD

©Copyright ISICAD, Inc., 1989. All rights reserved.

See us at Communication Networks (CN '91) - Jan. 29-31 - Washington,DC

See the FAXNeT Form on Page 58

Chrysler extends its MCI Vnet to connect 5,300 auto dealerships

By Anita Taff
Washington Bureau Chief

DETROIT — Chrysler Corp. has signed a contract with MCI Communications Corp. to extend its internal Vnet virtual network service to as many as 5,300 dealerships nationwide, *Network World* has learned.

By signing onto Chrysler's corporate voice network, the dealerships can cut communications costs and utilize advanced Vnet features such as special dialing plans, said Dave Bartlo, Chrysler's manager of sales management information. Dealerships are independent and can choose to stay with their current long-haul service provider, but Bartlo predicts that 50% to 60% of the locations will switch.

Chrysler signed a three-year contract with MCI earlier this year for Vnet and data services. The automaker's network connects more than 500 of its manufacturing, assembly and distribution facilities in the U.S., Puerto Rico and Canada.

Dealerships could enjoy substantial volume discounts on calling service — as much as 30% below current rates — by joining the network, Bartlo said. Many of Chrysler's dealerships are small firms that cannot qualify for volume discounts on their own.

Chrysler hopes that reducing costs will encourage dealerships to work more closely with one another and the manufacturer's regional offices to improve sales and service.

Bartlo estimates that about 10% of Chrysler's dealerships use MCI services. He said savings will be roughly the same for all dealerships regardless of their current long-distance provider.

Dealerships will also qualify for volume discounts on their 800, calling card and pay phone services through the MCI deal.

In addition to saving money, dealerships will be able to streamline operations by using specialized dialing plans, Bartlo said.

For example, the parts department at each dealership could be assigned a unique code, such as 4455. Then, in order to call any dealership across the country to find a part, users would only need to know the telephone number prefix of that location.

According to Bartlo, this is not the first bulk buying program Chrysler has sponsored for its dealerships.

The automaker also purchases workstations in bulk and leases them to dealerships for use with Chrysler's nationwide very small aperture terminal network, he said. Chrysler sends inventory data and video training messages to dealerships over the VSAT network. ◼

VARISWITCH

A Switching System with a variety of interfaces, and a variety of controls

T-Bar's VARISWITCH is based on the radical idea that a network switching system should be simple. Simple to configure. Simple to control. Simple to modify or expand to meet changing network requirements. The VARISWITCH is simply all these things and more.

It's versatile—The microprocessor-based control system permits both local and remote-site network control from any central location, via manual push-buttons, CRT terminal or direct computer link.

It's modular—System components are all individual front-loading units that can easily be configured for virtually any network switching requirements—from 16 lines up to 1,000.

It's expandable—So you can meet your switching needs today—and then simply add capacity whenever you need it.

It's programmable—With clear menu-driven CRT displays to guide the operator through every aspect of system control.

It's fully-featured—With complete monitoring and alarm functions.

It offers simply everything you need to solve your network switching requirements—today and tomorrow. And it's built by T-Bar, a Data Switch Company, the industry's largest supplier of **professional-grade** switching products for virtually every data network management application. What could be simpler than calling (203) 926-1801 for complete details on the T-Bar VARISWITCH?

PRODUCTS
T-bar®
DATA SWITCH CORPORATION
One Enterprise Drive, Shelton, CT 06484

1-800-328-3279

Now Available with Fiber Optic Transfer Modules!

See the FAXNeT Form on Page 58

IBM, 3Com release spec for LAN mgmt.

continued from page 2

Since HLM was first announced, a two-layer net management specification closely aligned with CMIP has also been selected by the IEEE 802.1B committee for LAN network management, according to Bill Lidinsky, manager of the High Energy Physics Network at Fermi National Accelerator Laboratory in Batavia, Ill., and chairman of the 802.1 committee.

This makes it virtually the same as the HLM specification.

A live standard

"That's even better news because instead of being de facto, it'll be a real live standard," Frank said.

Prior to general availability of the HLM document, IBM and 3Com distributed it to Banyan Systems, Inc., Microsoft Corp., Novell, Inc. and The Santa Cruz Operation, Inc. (SCO) for comments.

The primary concern raised by those vendors centered on a perception that HLM may have been too closely aligned with the 3Com/Microsoft Network Driver Interface Specification (NDIS), according to Rich Watson, manager of enabling software in 3Com's Network Adapter Division. Also adopted by IBM, NDIS is a universal device driver that enables operating systems to use LAN interfaces from different manufacturers.

Since those early HLM drafts, the specification has been edited to more clearly delineate how it can be supported by Novell's DOS-based NetWare, Banyan's Unix-based VINES and SCO's implementation of Unix.

The 802.1B committee adopted the two-layer version of CMIP as a replacement for a specification it had already been working on, Lidinsky said.

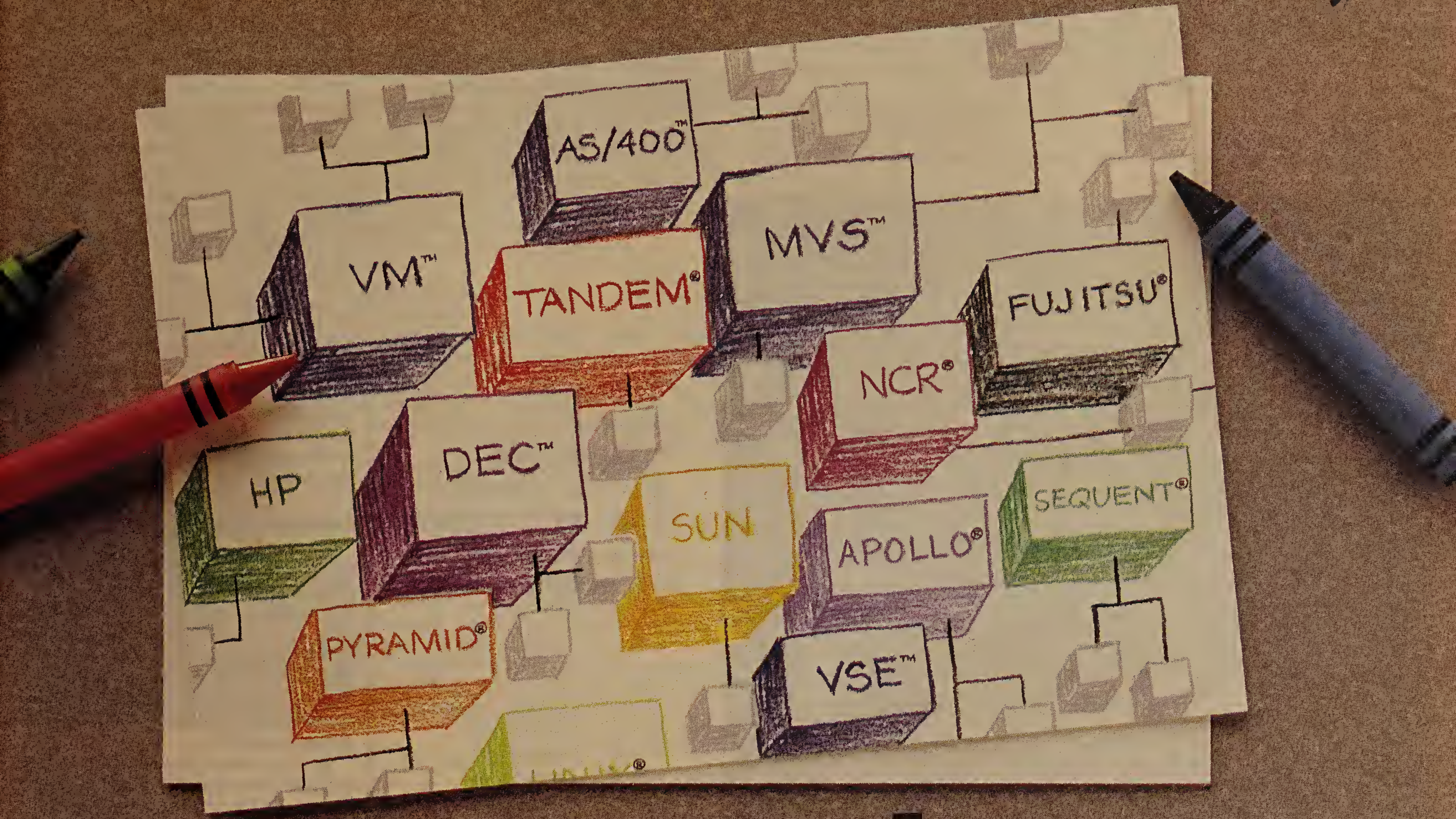
The difference between the specifications is that HLM and the new 802.1B specifications use CMIP over Logical Link Control (CMOL) as their transport protocol.

The previous document did not use the CMOL transport protocol.

Although work in the Institute of Electrical and Electronics Engineers, Inc. will initially parallel that being done by 3Com and IBM, HLM is likely to be merged with the specification being worked on in the IEEE, according to John Hart, chief technical officer at 3Com.

Hart predicted that following incorporation of vendor comments into the HLM specification, the HLM and 802.1B specifications could be implemented by mid-1991, with completion of the IEEE standard to follow later in 1991. ◼

To manage a multi-vendor network,



you need a multi-vendor vendor.

As multi-vendor information networks have become a fact of life, the ability to make everything work together has become a critical success factor — and a major differentiator among software vendors. At Systems Center, we've made the management of multi-vendor environments a top priority. And we offer integrated, multi-platform solutions that meet wide-ranging needs at both the mainframe and departmental levels. Whatever your own environment looks like, we're one multi-vendor resource you can count on. For information, write or call Systems Center, Inc., 1800 Alexander Bell Drive, Reston, Virginia 22091, 800-533-5128.

SYSTEMS CENTER

Systems and network management for the real world.

©1990 Systems Center Inc. MVS, VM, AS/400 and VSE are trademarks of International Business Machines Corporation. DEC is a trademark of Digital Equipment Corporation. Tandem is a registered trademark of Tandem, Inc. Fujitsu is a registered trademark of Fujitsu, Ltd. Apollo is a registered trademark of Apollo Computer, Inc., a subsidiary of Hewlett-Packard, Co. NCR is a registered trademark of NCR Corporation. Sequent is a registered trademark of Sequent Computer Systems, Inc. Pyramid is a registered trademark of Pyramid Technology Corporation. Unix is a registered trademark of AT&T Bell Laboratories.

See the FAXNeT Form on Page 58

DEC official details efforts to weave PCs

continued from page 1

dence that it fears these new types of products will cut into its traditional [profit] margins," said Steve Wendler, vice-president of Gartner Group in Stamford, Conn.

Master of many worlds

DEC's personal computer integration strategy is based on its Personal Computing Systems Architecture (PCSA), which enables users to integrate microcomputers with VAX/VMS, Unix and OS/2 servers into a DECnet LAN. This LAN is part of a broader enterprise network.

PCSA software can also be used to integrate existing LANs based on Microsoft Corp.'s OS/2 LAN Manager into DECnet by layering PCSA software on top of LAN Manager. However, customers with older MS-Net-based LANs must replace the network operating system with PCSA to participate in a DECnet environment, Nusbaum said.

PCSA consists of client software that runs on LAN workstations and server modules for a range of machines, including microcomputers and VAX minicomputers.

DEC has outfitted its PCSA client software with basic file- and print-sharing capabilities comparable to services offered in network operating systems from LAN suppliers such as Novell, Inc. and 3Com Corp.

But unlike LAN workstation software from those vendors, the PCSA client bundles applications together with transport protocols and network operating system software.

Nusbaum said PCSA, for instance, offers a range of applications from electronic mail and file transfer functions to data base front ends that provide the means to access SQL data bases anywhere across a DECnet.

"We want LAN users to be able to reach any data on the network as if it were locally attached," Nusbaum said. "That's a key difference between us and other vendors; we're not tying isolated LANs to a corporate network."

DEC offers PCSA client software for DOS, OS/2 and Apple Computer, Inc. Macintosh workstations. The software enables machines running those operating systems to access applications running on OS/2, Ultrix or VMS-based VAX servers.

One major limitation of the PCSA strategy is that DEC can't support client workstations on Novell NetWare LANs. "There's not much we can do with NetWare," Nusbaum said. "It's a totally different architecture."

Server software

DEC's PCSA server software runs on VMS-, Ultrix- and OS/2-based servers. Within those environments, it offers basic file and print services to LAN workstations running PCSA client software, as well as data base services that enable LAN users to connect to a variety of SQL data bases within a companywide DECnet.

VMS-based PCSA server software supporting clients in LAN Manager and MS-Net LANs processes requests for data by encoding them in a packet supporting the Server Message Block (SMB) protocol in LAN Manager. PCSA then uses LAN Manager's redirector to map the SMB packet address to a corresponding VMS address and then to route it to that destination over DECnet.

"This allows us to achieve application integration across different environments," Nusbaum said. "Not only can DOS users look into VMS files, but DEC Decision users, for instance, can import DOS data directly into an application. That's a level of PC integration you'd be hard-pressed to find elsewhere."

Hardware choices

On the hardware side, DEC offers a range of servers. Nusbaum said users could employ any Intel-based personal computer as a dedicated server on a personal computer LAN to be integrated into a DECnet environment. In addition, the company's MicroVAX 3100 line can be used as an entry-level server that supports 10 to 48 users but just two simultaneous terminal-emulation sessions.

In late October at Unix Expo in New York, DEC also announced the DECsystem 5500 and 5100 computers, which can be used as servers in an Ultrix environment. Prices for those systems start at $10,995.

In addition, DEC introduced what many — including one DEC official — said was a superserver, the ApplicationDEC 433MP server ("DEC unveils a 486-based superserver," *NW,* Oct. 22). However, Nusbaum maintains that the machine is not being positioned as a superserver and will be marketed solely to The Santa Cruz Operation, Inc. Unix users.

But when the ApplicationDEC 433MP was introduced, Bob Burley, manager of product marketing for DEC's General Systems Business unit said, "If Compaq [Computer Corp.]'s SystemPro is a superserver, then this is definitely a superserver."

Gartner Group's Wendler said, "This is a situation where white man speak with forked tongue, which is confusing to people. DEC is clearly playing a marketing game in an attempt to avoid cannibalizing its own VAX lines."

Nusbaum said his company's VAX 4000 line, announced this past July, provides performance and storage comparable to superservers ("New DEC VAX can be LAN server, multipurpose mini," *NW,* July 9).

The VAX 4000 is capable of supporting 50 to 220 users and employs proprietary VAX technology, but with a starting price of about $75,000, it does not compare to superservers offering similar performance for $20,000 and above.

"The VAX 4000 is the first in a family," Nusbaum said. "I'd expect to see lower cost units eventually." ◪

Only one VSAT company gives you a single source for everything from equipment to terrestrial circuits.

One source. One responsibility. It's *AT&T SKYNET® Clearlink Service.* And it's provided by AT&T Tridom.

AT&T is the only name you need to know for VSATs. From equipment to terrestrial connections. Installations to operations. You'll be doing business with one company that will control the implementation of your VSAT network. AT&T won't risk your business with anyone else. For more information, call your AT&T account executive, or call 1 800 346-1174, extension 610.

Bringing space-age communications down to earth.

AT&T
Tridom

See the FAXNeT Form on Page 58

INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS AND FINANCIALS

Worth Noting

> "Everything DEC sells today, other than the VT-100 or VT-200, is called a server."
>
> **Doug Gold**
> Analyst
> International Data Corp.
> Framingham, Mass.

People & Positions

Micro Tempus, Inc., a local-area network-to-mainframe software specialist, recently named former **Microsoft Corp.** Product Manager **Halim Dunsky** to the position of senior vice-president of business and product development. The company also named former **Oracle Corp.** Sales Manager **Edward Welch** to the position of senior vice-president of sales.

In his new role, Dunsky is responsible for establishing and managing strategic alliances with such companies as Apple Computer, Inc., Digital Communications Associates, Inc. and Microsoft. At Microsoft, Dunsky was product manager for the DCA/Microsoft Communications Server.

Welch will direct the company's U.S. sales operations from a new Waltham, Mass., facility. At Oracle, he was charged with developing a sales strategy to sell the company's data base management system products to the insurance industry.

Orion Network Systems, Inc. has announced the promotion of **Denis Curtin** to president of its subsidiary, **Orion Satellite Corp.**

Curtin is replacing **Carl English**, who has stepped aside for personal reasons.

As president, Curtin assumes responsibility for the overall business of Orion Satellite, including the development and operation of a Ku-band satellite system for transatlantic business communications services. The first launching of the satellites is planned for 1993. Curtin joined Orion Satellite in 1988.

UB/ACC deal to add routing capabilities to Access/One

Should help UB match rivals' hub capabilities.

By Bob Brown
Senior Editor

SANTA BARBARA, Calif. — Ungermann-Bass, Inc. recently said it will market Advanced Computer Communications' (ACC) Series 4000 bridge/routers for use with its Access/One intelligent wiring hubs under a multimillion-dollar OEM agreement.

Ungermann-Bass and ACC also announced a related technology agreement under which Ungermann-Bass will fund ACC's development of a bridge/routing module for use in Ungermann-Bass' Access/One intelligent wiring hub.

The agreements for the first time enable Ungermann-Bass to offer routing capabilities with its Access/One intelligent wiring hub and help it better compete with other hub vendors that have bolstered their product lines with internetworking capabilities via partnerships with other vendors.

ACC's multiprotocol Series 4000 bridge/routers, which are stand-alone devices, and the bridge/router module ACC will develop for Ungermann-Bass' Access/One hubs will enhance Ungermann-Bass' existing product line.

The OEM agreement calls for ACC to supply Ungermann-Bass with roughly 1,000 units during the next year, a source within ACC said. Ungermann-Bass will begin selling ACC's bridge/routers immediately, said Gary Krall, ACC's director of marketing.

Ungermann-Bass has not set pricing for the product.

The internetworking agreement could help Ungermann-Bass match capabilities already under development by hub rivals. Neither Ungermann-Bass nor ACC would say when the integrated bridge/router modules will be available.

Ungermann-Bass' strategy is to continue reselling the stand-alone Series 4000 units even after an Access/One bridge/router module is developed, Krall said. Users would be expected to use the module for local bridge/routing and use the stand-alone device at remote sites, he said.

Plans are to enable users to manage the bridge/router modules and ACC's Series 4000 devices under Ungermann-Bass' network - management scheme, Krall added.

INDUSTRY BRIEFS

Spanish court rules in Novell's favor. Novell, Inc. last week said a Spanish court has ruled that a Madrid software company violated Novell's intellectual property rights by copying and selling its NetWare network operating system under a separate brand label. The court concluded that Computer Technology de Espana, S.A. copied Novell's Advanced NetWare and resold the product as its own CompNet. The court barred Computer Technology from selling CompNet and ordered an inventory of all revenue derived from CompNet sales in order to assess damages to be awarded to Novell.

Novell filed suit in 1989 against Computer Technology, seeking damages for copyright infringement and asking for an injunction to block sales of the pirated software.

BusinessLand reorganizes. BusinessLand, Inc. last week announced a companywide reorganization to focus on providing client/server computing products and services.

The company restructured into four divisions: Network Systems, which offers applications and systems integration services; General Products, which handles direct sales to corporate and government customers; Service, which provides maintenance and spare parts; and Distribution, which is responsible for warehousing, distribution and purchasing for the other groups.

"With the new Network Systems strategy, BusinessLand has differentiated itself by providing applications for specific vertical markets and technology that readily facilitates the migration of large system applications to a client/server environment," said Ed Snyder, president and chief operating officer at the company.

Retix's past and present OSI markets

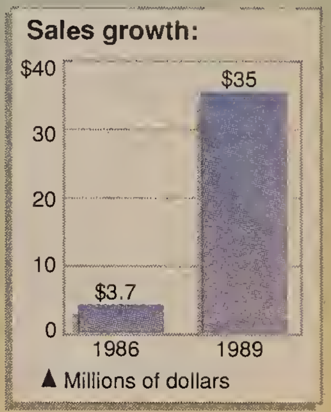
Founded: January 1985 by Andy De Mari, chairman of the board, and John Stephensen, senior vice-president of technology, with private investors.

Primary market: Provider of OSI software to 160 OEMs. Also markets local and remote bridges and routers.

Sampling of major OEMs:

☐ MCI Communications Corp.
☐ NCR Corp.
☐ NEC Corp.
☐ Philips Industries, N.V.
☐ Siemens AG
☐ Wang Laboratories, Inc.

New market: OSI software for end users. First products were the OpenServer 400 and RetixMail, both of which shipped April 1989.



GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: RETIX, SANTA MONICA, CALIF.

Retix to make mark on end-user market

Vendor targets PC LAN end of market with X.400, other OSI products to avoid conflict with OEMs.

By Ellen Messmer
Washington Correspondent

SANTA MONICA, Calif. — Retix, a major provider of Open Systems Interconnection software to the vendor community, is poised to make its mark in the end-user market, company executives said last week.

After a sputtering start in the end-user market two years ago, Retix executives said the company will announce three major contract awards in the next few weeks that will make it one of the largest suppliers of OSI software to the government sector.

"We view these awards as the basis of all future awards to implement OSI on desktop devices," said Steve Frankel, Retix president and chief executive officer, in an interview with *Network World* last week.

Although Frankel declined to disclose details about the contracts, a source close to the company said Retix will supply a range of software — including X.400 electronic mail, virtual terminal and file transfer software — for use on microcomputers and minicomputers in local-area networks.

Retix will act as a subcontractor to several vendors that were awarded the hotly contested Desktop III, Small Multiuser Computer and AFCAC 251 contracts issued by various government agencies.

Users in sight

Frankel said the awards indicate that "The [Government OSI Profile] mandate is starting to come to fruition" and dovetail with a shift the company instituted almost two years ago to focus on supplying OSI products to end users.

"You're talking about the beginning of a huge buying cycle," Frankel said. "We've planned all along to be in position to win these contracts."

About two years ago, Retix decided to make a run at the end-user market, but the company feared repercussions from the more than 160 vendors that use its OSI source code to provide software for workstations and high-end systems. To avoid competing against its OEMs, Retix decided to make its end-user push into the LAN market.

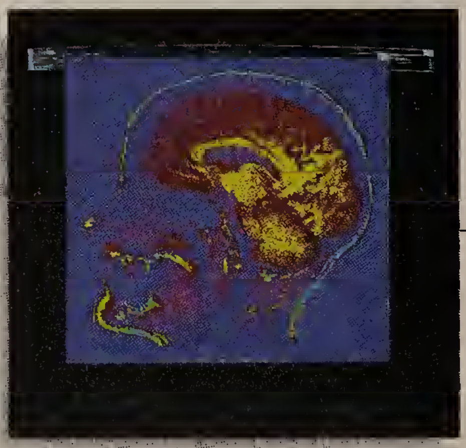
Retix tested the end-user waters with two products, OpenServer 400 and RetixMail, both of which it introduced in April 1989. RetixMail is E-mail software for client workstations on a LAN that interfaces to the company's OpenServer 400. OpenServer 400 is server software that converts proprietary mail messages into X.400 formats and hands them off to an X.400 message transfer agent, which routes them over a public or private net.

However, the company miscalculated user needs. RetixMail could not easily displace popular proprietary E-mail systems, and the product subsequently was shelved, according to Mark Jung, general manager of the Retix OSI product unit. Frankel said the company is still promoting the product in Europe.

Without an E-mail front end for its OpenServer 400 product,

(continued on page 65)

Now send 10 times more data every second with Digital's Ethernet and FDDI solution.



Ethernet 10 Mb/sec.

©Digital Equipment Corporation, 1990. The DIGITAL Logo, DECbridge, DECconcentrator, DEC FDDIcontroller, DECstation, DECelms, DECnet and Digital has it now are trademarks of Digital Equipment Corporation.
Integrated Image Management graphics generated by SMS.

digital™

Digital has a way to put Ethernet in a whole new light.

Just look into Digital's complete line of FDDI fiber-optic networking products. And get ready to see throughput improve between Ethernet LANs by a power of 10.

The best Ethernet solution made even better.

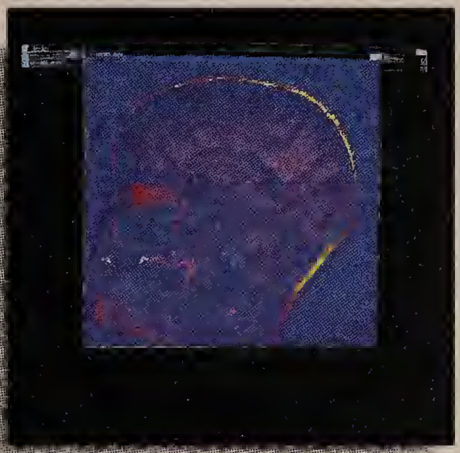
802.3/Ethernet is the most widely used LAN technology in all the land. And Digital has been Ethernet's leading innovator for as long as there's been an Ethernet.

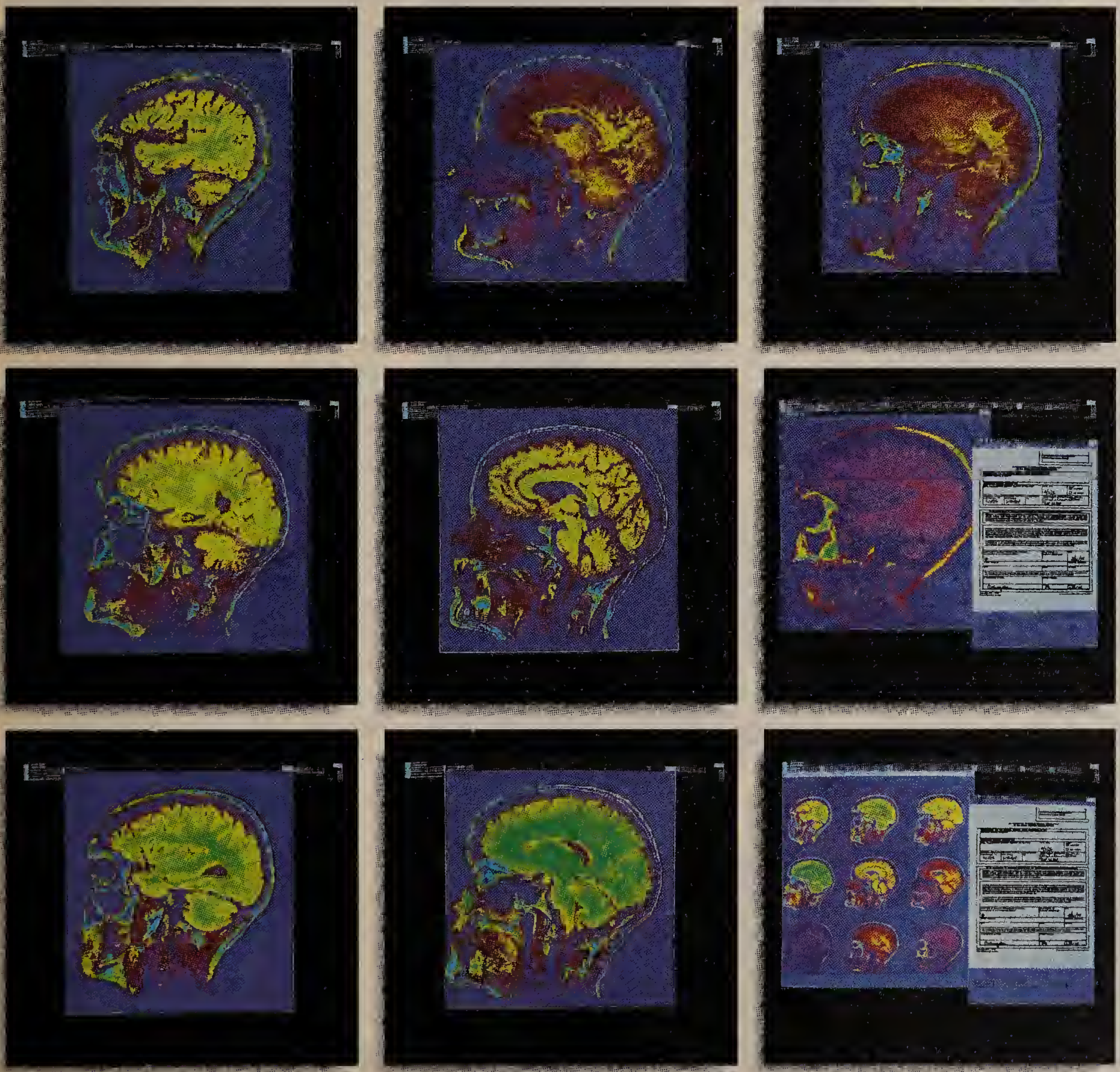
But now, with our complete FDDI solution, the best in LANs just got better.

FDDI. The cure for LAN-locked data.

FDDI is the fiber-optic standard that sets new standards for performance. Offering data rates of up to 100 Mb/sec.

With Digital's complete line of FDDI and Ethernet products, you can network workstations, servers and storage devices for fast, reliable performance. Our DECbridge™ 500 interconnects an 802.3/Ethernet and a high-speed 100Mb/sec. FDDI network backbone. The DECconcentrator™ 500, a modular, fully manageable hub, attaches FDDI devices, like workstations and bridges, to the primary backbone ring. Our DEC FDDIcontroller™ 700 is the high-performance FDDI controller for DECstation™ 5000s. And, DECelms™ is the software that lets you manage extended LANs, both Ethernet and FDDI, with just one management product.





And now for the complete picture.

Digital's FDDI products are the perfect solution for network-intensive, high-bandwidth applications like graphics, compound documents, high-speed access to distributed databases, and imaging—for example, the Integrated Image Management system from SMS shown in this ad.

Our Ethernet/FDDI solution supports any workstations or computer systems that comply with DECnet™, OSI or TCP/IP networking standards. And our Ethernet/FDDI solutions serve as the foundation for Digital's ground-breaking Network Application Support (NAS), a comprehensive set of software that enables applications integration across a distributed multi-vendor environment. When you build network applications using NAS, you can be assured of long-term stability and compatibility, even as new technology evolves.

The performance leader in open networks.

Our new FDDI products are just one example of Digital's leadership in networking. With our tradition of technological innovation, intelligent network management and a steadfast commitment to open standards, Digital's networking gives you a way to tie your company together, without tying you down.

For more information, call your local Digital sales office.

Digital
has
it
now.

Digital's Ethernet/FDDI, 100 Mb/sec.

Now Is No Time To Discover That Your Digital Network Doesn't Have Dial Back-Up.

Even the very best digital service is a bit of a gamble. Because none can guarantee 100% uptime.

So who can offer the digital solution that's closest to perfection?

ONLY GDC CAN.

Our new 500C family of DSU's is designed to take full advantage of the cost/performance benefits of digital service.

Consider our 500C/DBU. It incorporates a V.32 compliant Dial Back-Up unit for the ultimate in uptime and reliability.

It also enables you to gain the high performance of a private digital network and the flexibility of the analog public network with the same product.

The entire 500C family operates at multiple speeds; in synchronous or asynchronous modes. And all our DSU's are upgradeable for full network management, so your network won't ever become obsolete.

Further, GDC's exclusive DataCommonality allows you to mix and match analog and digital data sets (including intelligent T-1 CSU's) in the same space-saving racks.

But of course, you'd expect all this from GDC, the one broad-based vendor who not only fully understands the digital and analog marketplace, but also has installed more than 150,000 digital terminations.

Find out more. Contact GDC today and ask about our DataComm and Network Management versions of the 500C/DBU families.

Call Toll Free **1-800-777-4005**. Or (203) 574-1118. Fax: (203) 758-8507. Telex: 643357. General DataComm, Middlebury, CT 06762-1299.

ONLY GDC CAN

See the FAXNeT Form on Page 58

General DataComm

See the Action Center for
networking products & services!

Use the Action Center Reader Service Card
and get free information
on networking products & services.

TELECOMMUNICATIONS

CARRIER SERVICES, CENTREX, CPE, WIRING SYSTEMS AND BYPASS

Worth Noting

AT&T customers are pressing the carrier for increasingly customized virtual network calling cards. Owens-Corning Fiberglas Corp.'s Software-Defined Network calling cards, for example, carry the firm's logo and a picture of the Pink Panther, its corporate symbol.

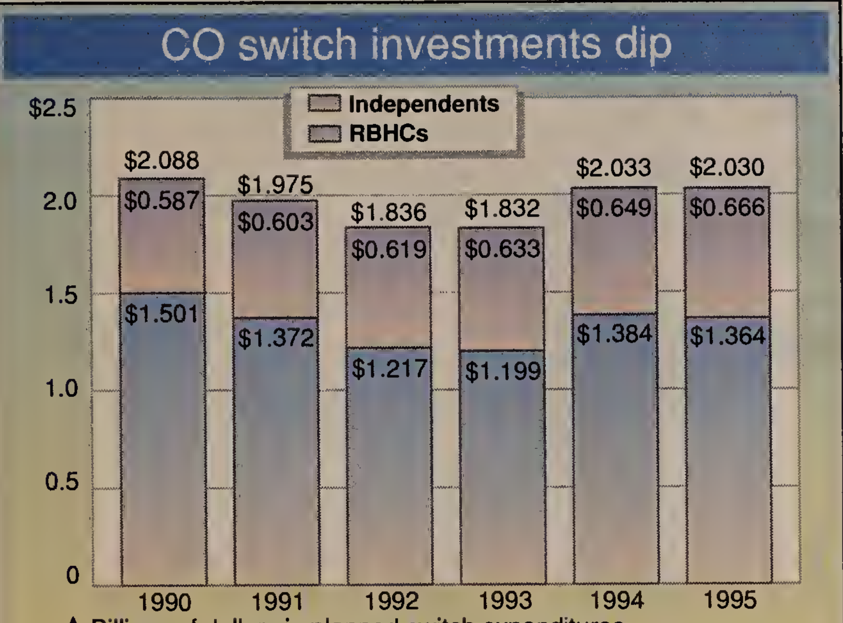
Carrier Watch

Metropolitan Fiber Systems, Inc. (MFS) last week announced availability of physically diverse alternative access and private-line services to buildings served by the lower Manhattan portion of its New York fiber-optic bypass net.

The MFS New York network will be expanded to serve buildings in midtown Manhattan in January 1991 and buildings in the New York boroughs of Manhattan, Brooklyn, the Bronx and Queens later in the year. MFS now operates fiber networks in 10 U.S. cities.

AT&T last week said the 148.4 million calls made on Nov. 26 made it the busiest calling day in the company's history. Calling volume exceeded the previous record of 144.7 million calls set on Oct. 18, 1989, the day after a major earthquake rocked San Francisco. The new record was a 12.9% increase over calling volume on the Monday following Thanksgiving last year, AT&T said.

In a separate item, AT&T last week announced a three-year contract with Choice Hotels International to provide long-distance service to guest rooms and pay telephones at the hotel chain's 2,200 locations worldwide. Under the agreement, worth a maximum value of $120 million, AT&T will also provide 24-hour-a-day operator services for calling card, person-to-person, collect and bill to third-party calls from Choice hotels. ◻


CO switch investments dip

▲ Billions of dollars in planned switch expenditures

Central office switch investments in the 1980s are expected to satisfy short-term needs and cause a market dip in the early 1990s.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: BUSINESS RESEARCH GROUP, NEWTON, MASS.

Nynex attacks foes seeking to reopen overcharge case

Says request of state agencies is without merit.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — Nynex Corp. recently filed a petition with the FCC saying that recent efforts by two New York state agencies to have the FCC reopen a February overcharging case were misguided and without merit.

The New York Office of the Attorney General and the state's Consumer Protection Board said in an earlier filing that the Federal Communications Commission acted improperly when it decided to sign a consent decree with the carrier rather than pursue legal action on the overcharging case.

> Nynex claims that the FCC understood the full extent of the purchasing improprieties.
>
> ▲▲▲

The state agencies said that the FCC conducted private negotiations with Nynex, which deprived them of an opportunity to present new evidence that the carrier's misconduct was more far reaching than first thought. This could mean that the FCC misjudged how high refunds should be.

In February, the FCC said it had evidence that Nynex was siphoning profits from its regulated telephone companies — New England Telephone and Telegraph Co. and New York Telephone Co. — by forcing them to buy goods and services at inflated prices from a Nynex subsidiary, Materiel Enterprises Co. (MECO). The FCC said the telephone companies passed along $120 million in excess costs to ratepayers by paying inflated prices.

To compensate users for the overcharges, the FCC said it would order Nynex to reduce interstate access rates — the only services over which the FCC has jurisdiction — by $35.5 million, pull 32.6 million out of the carrier's rate base and fine Nynex $1.4 million.

After several months of negotiations with Nynex, the FCC signed a consent decree that dropped the charges if Nynex accepted those sanctions voluntarily.

Nynex acknowledged that it had negotiated a settlement privately with the FCC but said there is nothing illegal about that.

"The contention that the commission was obligated to allow interested persons an opportunity to comment upon the decree and to provide a reasoned analysis for adoption of the decree runs counter to the law," the carrier said in its filing.

Nynex claims that the FCC considered all of the evidence in the case and understood the full extent of the purchasing improprieties.

"Obviously, the commission believed that the prompt resolution of this proceeding via a consent decree that gave the commission the full measure of relief it sought for ratepayers was preferable to continued litigation . . . and the likelihood of judicial review," Nynex said. ◻

AT&T to phase out monthly MLW plan

Customers with Multi-Location WATS plan will be migrated to longer term contracts, other services.

By Bob Wallace
Senior Editor

WASHINGTON, D.C. — AT&T is pressing companies that use its Multi-Location WATS plan to sign longer term contracts or move to Software-Defined Network (SDN) service or custom network arrangements.

In a recent filing with the Federal Communications Commission, AT&T proposed eliminating the monthly version of its Multi-Location WATS (MLW) plan and waiving contract termination charges for MLW users that switch to SDN service or sign up for custom networks under Tariff 12 or Tariff 16.

Under the new plan, customers that buy AT&T services on a monthly basis under MLW must sign 12- or 18-month contracts by Jan. 1 to keep the service. Users with existing long-term contracts must renew the deals for the same length of time or move to higher end services.

AT&T's MLW multisite discount plan enables customers to combine Pro WATS and Megacom WATS service at multiple sites under one bill for volume discounts.

MLW users with up to 23 sites pay $2,500 a month, those with 24 to 60 locations pay $1,500 a month, and users with 61 to 71 sites pay $1,000 a month. There is no monthly MLW charge for users that list more than 71 sites.

AT&T also proposed waiving the monthly MLW charge for customers of the service that use Megacom WATS and have signed a Megacom WATS term plan totaling more than $15,000 monthly.

First-year MLW customers with contracts in effect on Sept. 17, 1990, can renew the contracts for 12 or 18 months, or they can move to SDN, Tariff 12 or Tariff 16 arrangements without paying termination charges.

Customers would have to sign a contract equal to or greater in length than the terminated MLW accord and commit to a revenue amount equal to or exceeding the amount remaining on the original contract.

However, users that opt to switch carriers and cancel their contract before it expires must pay the MLW charge for each month remaining on the agreement, according to the filing.

MLW customers would have to notify AT&T at least 30 days in advance of the agreement expira-

(continued on page 65)

WASHINGTON UPDATE

BY ANITA TAFF

Final peek at price caps postponed. Congressional efforts to take one last look at price cap regulation before it becomes effective for local carriers in January stalled last week.

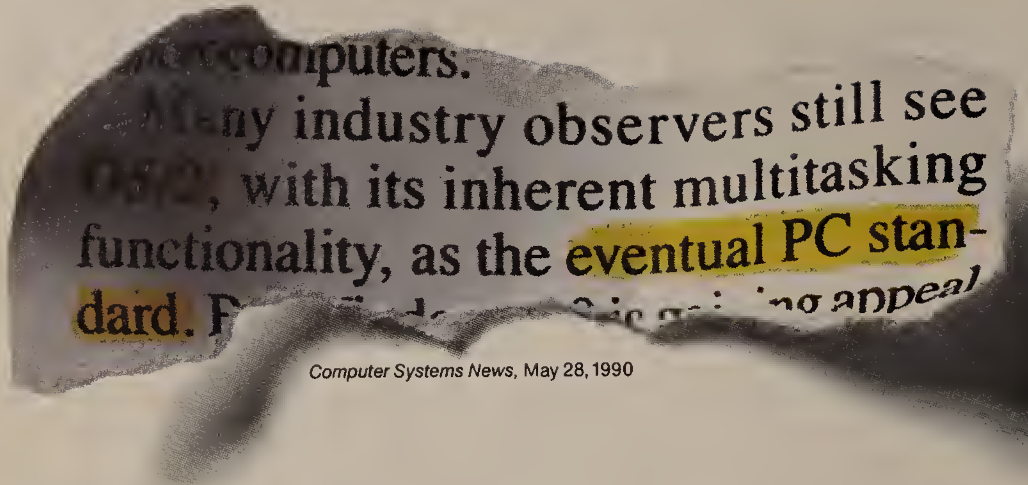
The House Subcommittee on Telecommunications had planned to hold a hearing in December on the new form of regulation, but an aide for Edward Markey (D-Mass.) last week said scheduling conflicts of key members made the hearing impossible. The hearing will be rescheduled for January when Congress returns from vacation.

Several lawmakers, as well as user and consumer groups, have expressed concern about how price caps will affect users.

Conference call guarantee. MCI Communications Corp. last week announced an audioconferencing service, dubbed MCI Forum. The carrier guarantees that MCI Forum conference calls, which are arranged by MCI operators, will not be delayed by more than 10 minutes.

MCI also announced two features of the service. The first, Personal 800 Meet Me, allows traveling employees to dial into a scheduled conference call using an 800 number. The other, ASAP Calling, allows users to have MCI operators put a rush on setting up unscheduled conference calls.

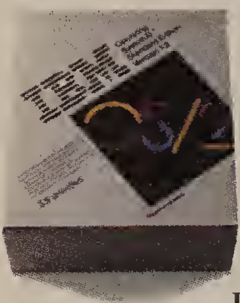
Rates for Personal 800 calls are 45 cents per minute and $6 per location, plus a onetime $35 setup fee. Rates for the ASAP service vary depending how the operator sets up the call. ◻


computers.
Many industry observers still see OS/2, with its inherent multitasking functionality, as the eventual PC standard. F ng appeal

Computer Systems News, May 28, 1990

“Eventually” is here.

ANNOUNCING THE OS/2 YOU'VE BEEN WAITING FOR.

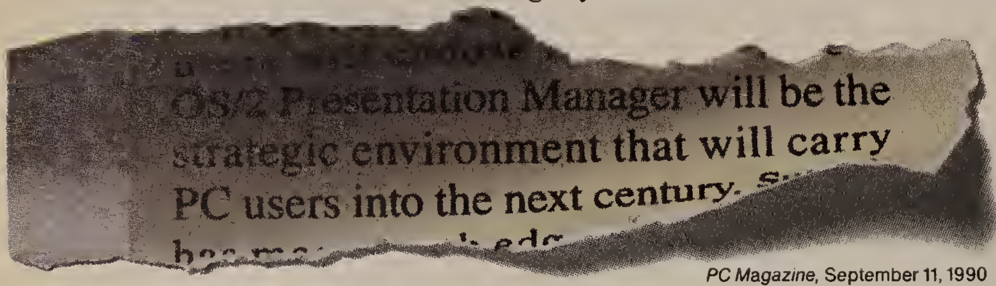


For quite some time, the press has been writing about the move everyone will want to make to OS/2.® Eventually.

Well, all at once OS/2 1.3 has made OS/2 the operating system it was meant to be—the one you'll want to move to right here and now.

OS/2 LOSES A LITTLE WEIGHT.

For starters, OS/2 has lost some of its appetite for memory. In fact, now you can make the move to OS/2 1.3 with as little as two megabytes on your system. What's more, this streamlined version leaves more room for applications and will offer some users a substantial performance increase in many system functions.

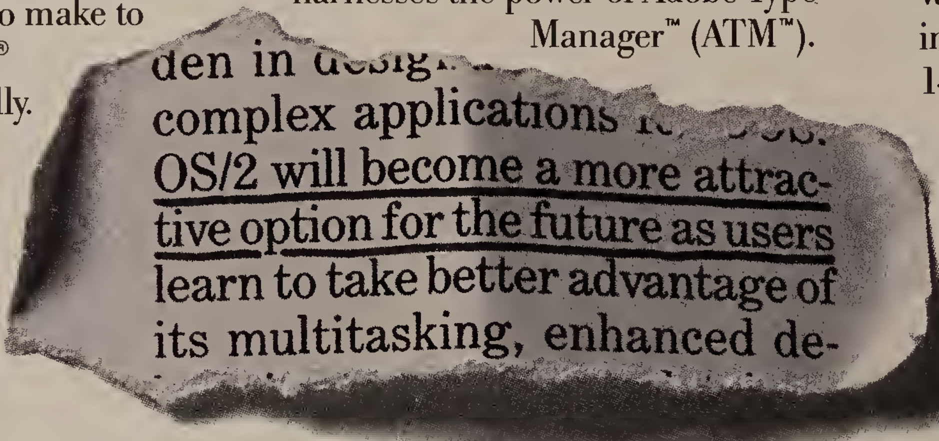

OS/2 Presentation Manager will be the strategic environment that will carry PC users into the next century.

PC Magazine, September 11, 1990

FUNCTIONALITY. FUNCTIONALITY. AND DID WE MENTION FUNCTIONALITY?

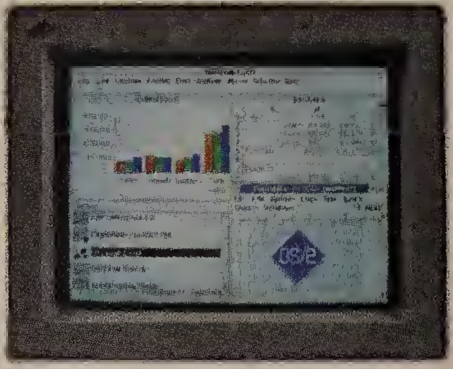
Multitasking. Seamless connectivity. The ability to run applications larger than 640K. DOS compatibility. All these features have made OS/2 appealing in the past, but new features have catapulted OS/2 into the here and now.

For instance, now OS/2 1.3 harnesses the power of Adobe Type Manager™ (ATM™). With this new feature, the quality of screen fonts has improved dramatically, giving you a true WYSIWYG capability so what you see is indeed what you get. ATM also gives OS/2 more flexibility in document creation by supporting a wide range of outline fonts.


den in design
complex applications
OS/2 will become a more attractive option for the future as users learn to take better advantage of its multitasking, enhanced de-

PC Week, August 13, 1990

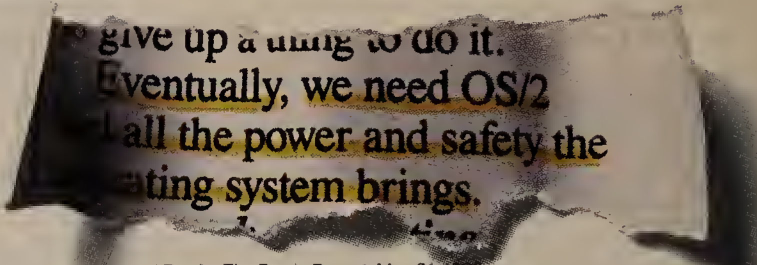
Of course, what good is all this without printer support? Not much. So OS/2 1.3 has improved and expanded its printer support to include drivers for almost all popular printers.



BUSINESS IS BOOMING.

Now that OS/2 is moving forward, so are software developers. Every day, more and more applications are joining the growing pool of available OS/2 software. In fact, a variety of major business programs, including Aldus® PageMaker,® Lotus® 1-2-3/G® and Microsoft® Excel, have already made the transition to OS/2. These, along with many others, have been redesigned to go beyond DOS memory limits and take advantage of OS/2's intuitive graphical interface—Presentation Manager.™

It's been said that eventually you'll want to take advantage of everything OS/2 has to offer. Well, wait no more because “eventually” is here.


give up a thing to do it.
Eventually, we need OS/2
all the power and safety the
ating system brings.

Will Fastie, The Fastie Report, May 31, 1990

For more information on what OS/2 can do for you here and now, or to get details on a no-charge upgrade to Version 1.3, contact your IBM Authorized Remarketer or marketing representative.

OS/2 can do!

IBM

IBM and OS/2 are registered trademarks and Presentation Manager is a trademark of International Business Machines Corporation; Microsoft, a registered trademark of Microsoft Corp.; Adobe Type Manager and ATM, trademarks of Adobe Systems, Inc.; Aldus and Pagemaker, registered trademarks of Aldus Corp.; Lotus and 1-2-3/G, registered trademarks of Lotus Development Corp. ©1990 IBM Corp.

DATA COMMUNICATIONS

PRODUCTS, SERVICES, ARCHITECTURES, STANDARDS AND NETWORK MANAGEMENT

Worth Noting

> “I think 1995 is the earliest we’ll see real [Open Systems Interconnection] solutions. Think about the number of platforms we’re talking about here; you’ve got to rely on every one of those vendors to provide you at least a set of fundamental services.”

Frank Diasparra
Vice-president
Advanced technology
Fidelity Systems Co.
Boston

Data Packets

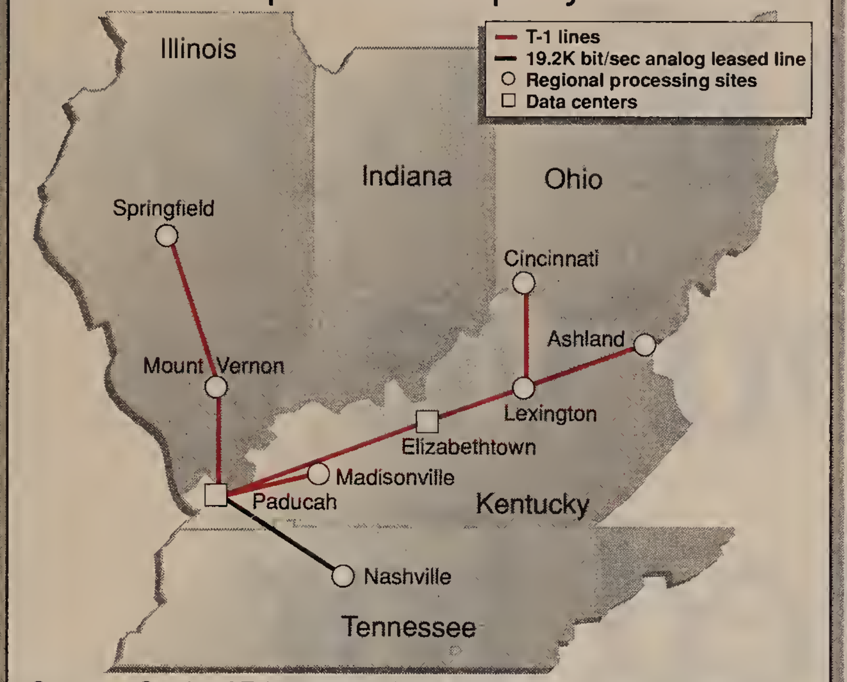
Data General Corp. last week announced a program under which it will service and support Sun Microsystems, Inc. workstations and servers in multivendor networks.

The service features four-hour response or next-day response service options and is based largely on an agreement between DG and Apex Computer of Redmond, Wash. Apex will train DG field engineers to service Sun equipment and provide spare parts. It will also offer backup services to DG staff.

Service rates depend on customer network configurations, DG said. For more information, call (800) 328-2436.

Officials of the **National Institute of Standards and Technology (NIST)** recently met with telecommunications managers from 15 federal agencies and challenged them to devise a common list of open systems requirements for vendors. NIST officials told attendees at the first meeting of the Federal Open Systems Users Council that they need to present a united front on such issues as network management.

The council intends to act as a liaison between federal users and vendors to advance open systems technology.


T-1 net improves company’s service

Computer Services’ T-1 network is holding down the cost of linking 170 banks to the company’s data centers as well as improving network uptime.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: COMPUTER SERVICES, INC., PADUCAH, KY.

T-1 net helps DP service provider keep costs in line

CSI installs net to link 170 banks to data centers.

By Jim Brown
Senior Editor

PADUCAH, Ky. — Data processing service provider Computer Services, Inc. (CSI) recently completed installation of a T-1 network that is keeping a lid on the cost of linking 170 regional banks to its two data centers.

The network also provides improved uptime and an infrastructure for offering new strategic services to its customers — banks that have outsourced data processing chores to CSI.

The network enables banks to gain on-line access to customer account files on CSI’s Unisys Corp. mainframes. It supports bulk file transfers of check data from regional processing sites, along with deposit and withdrawal slips, to mainframes at the firm’s data center.

The mainframes also use the network to ship reports to a printer at the regional site or a customer site.

CSI finished installing the network earlier this year and uses it to feed data via T-1 lines from seven regional processing centers to a Unisys A12 mainframe in a data center here or to a Unisys A6 mainframe in a data center in nearby Elizabethtown, Ky. Banks are linked to the nearest regional processing site via multidrop analog or digital leased lines operating at up to 19.2K bit/sec.

This setup eliminates the need to run multiple analog leased lines to the nearest data center, thus making it easier for operations staff to monitor the net.

“The old network had grown too large and was basically not as efficient as it should have been,” said R. Lee Hagan, vice-president of telecommunications. “And it was growing at a rapid rate.”

With the T-1 network, CSI has been able to keep its data communications costs slightly below what it was paying for the analog leased-line network two years ago. Not only that, CSI only uses 50% of the T-1 network capacity, leaving spare bandwidth to support new services without incurring additional transmission expenses.

“We’re just now starting to feel like we’re getting up to speed on this new network,” Hagan said. “Now we can start thinking about adding enhancements.”

> The net provides improved uptime and an infrastructure for offering new strategic services.

▲▲▲

For instance, CSI is carving out four voice channels on each T-1 link to enable staff at any regional center or data center to communicate. Previously, CSI could only cost-justify a leased voice tie line between its two data centers. Regional center staff had to incur dial-up expenses to reach another regional center or data center.

Telephone key systems in each regional location are attached to a voice interface board on the T-1 multiplexer, which

(continued on page 18)

Nations argue merits of Group IIIbis fax

Supporters say functionality could rival Group IV; detractors cite high-end mart split, user confusion.

By Barton Crockett
Senior Editor

GENEVA — An international dispute is brewing over proposed standards that would enable Group III facsimile machines to rival Group IV machines in performance and functionality.

Proponents of the standards, called Group IIIbis or Group III Enhanced, say the technology would greatly increase the performance of Group III fax machines by enabling them to do virtually everything Group IV machines do.

“It would give Group III [machines] all of the advantages of Group IV, plus some unique advantages of their own,” said a top U.K. representative to CCITT Study Group VIII who requested anonymity. CCITT Study Group VIII sets fax standards.

But detractors say Group IIIbis would splinter the high-end fax market because the machines would not be compatible with Group IV standards.

The governments of the U.K., U.S. and Soviet Union are among the leading supporters of Group IIIbis. Since 1989, they have floated at CCITT Study Group VIII meetings several proposals calling for standards to be modified to support Group IIIbis technology.

But these proposals have been opposed by the governments of France and Japan on the grounds that Group IIIbis would confuse users and lead to equipment incompatibilities. “We don’t want to confuse users with two incompatible standards,” said Yasuhiro Yamazuki, director of research at Kokusai Denshin Denwa, Ltd. in Tokyo and a vice-chairman of Study Group VIII.

Proponents of Group IIIbis argue, however, that the technology represents a natural step for-

(continued on page 18)

Timeplex offers Timepath multiprotocol switch line

By Paul Desmond
Senior Editor

WOODCLIFF LAKE, N.J. — Timeplex, Inc. last week said it will market products acquired via its purchase of Doelz, Inc. as its own Timepath family of multiprotocol switches.

The products are intended to lower users’ line costs by enabling multiple devices using different protocols to share the same line.

“The product line is a transparent transport of virtually any protocol available in the business today,” said Michael Zboray, senior manager for data networking systems at Timeplex.

Timeplex will retain the same product names for the four Timepath products. The Elite One and Mini-Elite are net concentrator switches that support terminal devices and feed data to Esprit One high-speed virtual circuit switches. The fourth is the Unix-based Engarde Element Management System (EMS), which manages the Timepath family.

Zboray said the switches support three basic protocol types: character asynchronous, such as standard ASCII; character synchronous, which includes the Binary Synchronous Communications protocol; and bit synchronous, which includes Synchronous Data Link Control, Link Access Procedure B and High-Level Data Link Control-formatted protocols.

All the switches will work with Timeplex’s existing Link family of T-1 multiplexers, as well as its Timepac family of X.25 packet switches, Zboray said.

Zboray declined to say whether the Engarde EMS will be integrated under a single umbrella management system along with Timeplex’s existing TimeView/2000 and TimeView/2500 systems, which manage the Link multiplexers and the Timepac equipment, respectively.

Timeplex understands the requirement for integrated network management, he said, noting that Timeplex supports AT&T’s Unified Network Management Architecture.

Prices for the Mini-Elite range from $4,035 to $4,965, and the Elite One costs between $6,195 and $17,500. The Esprit One is priced between $100,000 and $200,000, while the Engarde EMS costs $71,000. All of the products are available now.

If
you’ve
called for
connectivity and
gotten
tangled up in
vines...

We need to talk.

Look closely when someone promises unlimited networking. Many networking solutions are based on proprietary software, and that places serious restrictions on future growth.

Only Wollongong has the software products to effectively connect dissimilar hardware and software, because we base our solutions on open systems standards.

Only Wollongong lets you expand and manage your network, while you preserve the investments you've already made. Because we enhance your present environment, you don't have to give up, trade in, or disrupt your existing network.

In fact, for over 10 years, we've been helping Fortune 500 companies build corporate networks in multi-vendor environments.

So, when you're ready for healthy expansion, don't go barking up the wrong tree.

Call 1-800-872-8649 (in California 1-800-962-8649) or write The Wollongong Group, Inc. 1129 San Antonio Road, Palo Alto, CA 94303.

When you need to network, we need to talk.

WOLLONGONG

The leader in multi-vendor networking.

© 1990, The Wollongong Group, Inc.
All other product names are trademarks of their respective manufacturers.

T-1 net helps DP service provider

continued from page 15

compresses the voice to 32K bit/sec and routes it to an AT&T System 75 private branch exchange in Paducah. The PBX then routes the call to an extension in Paducah, back over the private net to another CSI site or to trunk line that enables the caller to dial a long-distance number.

"Our network was data-driven," Hagan said. "Data was the impetus for building the network, but voice is certainly an add-on benefit — sort of like cream on the top."

CSI is also planning a voice response service that would enable bank customers to make a local call to a CSI regional center, which would then route it via the private network to a voice response unit at the nearest data center.

In the network, Comstat DataComm Corp. C88000 terminal controllers in each branch use the Burroughs Poll Select protocol to transmit data from inbranch terminals as well as automated teller machines via a multidrop analog or digital circuit operating at up to 19.2K bit/sec to a Timeplex, Inc. Link/2+ T-1 multiplexer at the nearest regional center. The Link/2+ routes traffic over a T-1 circuit to a Link/2+ in front of a Unisys CP2000 front-end processor, which provides access to the mainframe at the appropriate data center.

The T-1 network links regional processing centers in Springfield, Ill., Mount Vernon, Ill., and Madisonville, Ky., to a data center in Paducah (see graphic, page 15). A small regional site in Nashville is linked to Paducah via a 19.2K bit/sec analog circuit because the site does not generate enough traffic to justify a T-1.

Regional centers in Cincinnati, Lexington, Ky., and Ashland, Ky., are linked via T-1 to the Elizabethtown data center. The two data centers are also linked via T-1.

When the network was first designed, Hagan said, CSI wanted to install a T-1 link between Cincinatti and Springfield that would provide an alternate path should one T-1 link fail. But performance on the T-1 circuits has been so good that Hagan said CSI cannot justify the extra expense to avoid what has so far been only minor inconveniences. ◘

Nations argue merits of Group IIIbis fax

continued from page 15

ward in the evolution of Group III.

Group III machines have internal modems and operate over analog transmission facilities at speeds up to 9.6K bit/sec. Group IV machines provide higher resolution output, support higher throughput and operate over digital links, typically at 56K or 64K bit/sec.

But now the boundaries between Group III and IV are blurring.

For example, during the next few months, the CCITT is expected to approve under accelerated procedures modifications to existing Group III standards that would let Group III fax machines use the same document compression algorithms used on Group IV fax machines. These algorithms compress documents into smaller chunks of data than existing Group III algorithms, thus increasing Group III throughput.

Likewise, the CCITT in 1992 is expected to approve Group III fax standard modifications that will enable Group III machines to support the same resolution as Group IV machines, according to Steve Urban, chairman of the TR-29 committee of the Telecommunications Industry Association, which prepares U.S. submissions to CCITT facsimile standards committees.

Both of these standards are a necessary part of Group IIIbis technology. But France and Japan oppose the most important part of Group IIIbis — enabling Group III machines to operate over digital links at rates up to 64K bit/sec.

Support of digital links would represent the final change, giving Group III fax machines virtually all the capabilities of Group IV machines.

According to Group IIIbis proponents, the new standards would let Group III fax machines surpass Group IV systems because fax machines supporting Group IIIbis would be able to interoperate with standard Group III machines while most Group IV fax machines can only work with other Group IV machines, they claim.

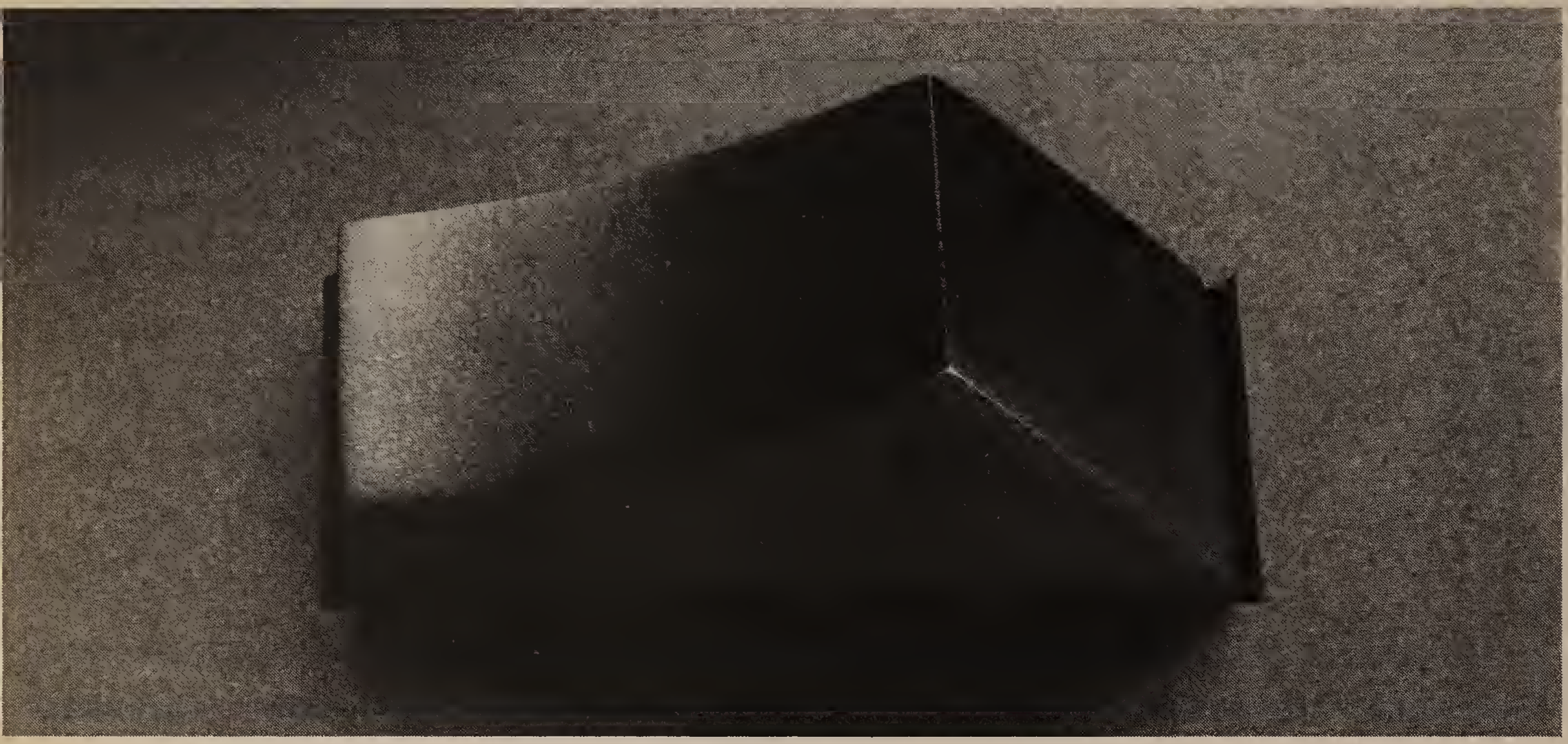
Group IIIbis machines would be able to work with existing machines because the new standards are based on relatively minor modifications to existing Group III standards, according to Dennis Bodson, assistant manager at the Office of Technology and Standards in the U.S. federal government's National Communications Systems bureau in Arlington, Va.

This means that manufacturers could deploy Group IIIbis as a standard option on high-end Group III fax machines. By contrast, Group IV technology is incompatible with Group III, meaning it will be difficult for manufacturers to support both Group III and Group IV standards in a single machine, Bodson added.

Group IIIbis machines also would have much faster call establishment times and higher throughputs than Group IV machines, according to the U.K. source. This is because Group IIIbis uses more efficient call establishment and error correction protocols, he said.

As a result, Group IIIbis proponents argue that the real reason the French and Japanese oppose the standards is a fear that Group IIIbis would make Group IV obsolete, thus wasting the sizable investments in Group IV technology by manufacturers and carriers in those countries.

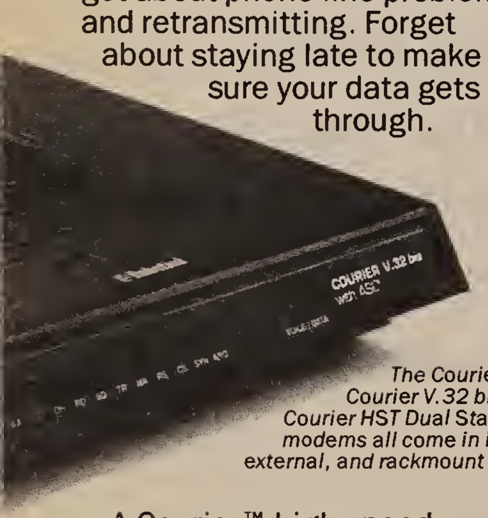
"I think they're worried that no one will be interested in Group IV and that eventually it will die," Urban said. ◘



Turn it on and forget about it.

Forget about walking into work to find your message light blinking with last night's modem problems.

Forget about downtime. Forget about phone line problems and retransmitting. Forget about staying late to make sure your data gets through.



The Courier HST,™ Courier V.32 bis,™ and Courier HST Dual Standard™ modems all come in internal, external, and rackmount models.

A Courier™ high speed modem works so well, you can forget about it altogether.

It's reliable by design. The data pump has fewer parts. Less to go wrong.

And we test every Courier modem mercilessly before we send it out.

General Electric. Kodak. USWest. Forty-three of the Fortune 50 have relied on Courier modems for years, and they can't afford trouble any more than you can.

Only Couriers give you ASL™ to keep you at maximum speed.

You'll notice the difference the first time you dial. Modems with ASL™ connect up to three times faster than other V.32 *bis* modems. That irritating, expensive wait for the connection is over.

ASL is U.S. Robotics' Adaptive Speed Leveling.

All modems have to slow down for line noise. But two high speed Couriers working together will speed up again when conditions improve.

All other modems leave you stuck in "low" for the rest of the transmission. That can turn a $1 call into a $10 call.

So if you think a modem that gives you 38,400 bps throughput has to be temperamental, relax.

Nobody handles the hassle of dial-up lines better than U.S. Robotics®

We're proud to say we make the most forgettable modems in the world.

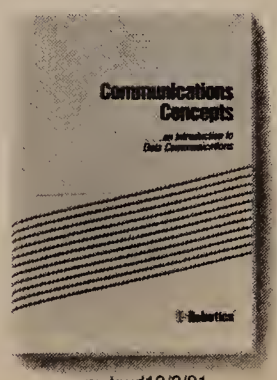
USRobotics®

The Intelligent Choice in Data Communications

Free Data Communications Reference Guide: This 108-page illustrated book quickly answers your data communications questions.

Please Print
Name:
Title:
Company:
Address:
City: State: Zip:
Phone: ( )

Mail to: U.S. Robotics, Inc., Attn: Marketing Dept., 8100 N. McCormick Blvd., Skokie, IL 60076, or call us toll-free at 1-800-DIAL-USR. In Canada: 1-800-553-3560. In the U.K.: Miracom Technology, Ltd. 0473 233-888.



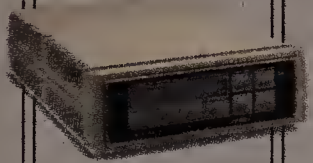
nwkwd12/3/91

USRobotics and the U.S. Robotics logo are registered trademarks, and Courier, Courier V.32 *bis*, Courier HST, Courier HST Dual Standard and ASL are trademarks of U.S. Robotics, Inc.

SURE, DIGITAL SERVICES CAN TRIM YOUR COSTS. BUT USE EXCALIBUR™, AND YOU CAN FLAT-OUT LEVEL THEM.

If you're taking advantage of the new, lower rates AT&T, MCI, RBOCs, and other telcos are charging for digital services, smart thinking. You're already making a solid contribution to your company's profitability and improving network reliability just by taking that step.

EXCALIBUR



The only Digital Access Products with multiport/ multidrop capabilities

ASDS COMPATIBLE

But there's something else you could do to reap additional savings of up to 50%. Use Excalibur™ Digital Access Products.

Only Excalibur offers digital multiport/multidrop capability—a true breakthrough in telecommunications. For the first time ever, different applications and configurations can utilize the same multidrop circuit simultaneously. Which means that with Excalibur, you can use the available bandwidth to its fullest advantage.

And there you have the bottom-line benefit of Excalibur. You can pack more data in the pipeline and pocket added savings in the process.

The Excalibur family includes both standalone and central site configurations and can be managed with or without a network management system like our own Communications Management Series (CMS®). Excalibur provides an easy, economical migration path from analog to digital. In fact, creating a wide variety of network configurations is as simple as changing a card or two.

And Excalibur lets you take advantage of most of the digital services available today.

Just how much Excalibur can save your company is a figure we'll gladly share with you. To arrange for a cost analysis of your communication needs, simply call **1-800-RACAL-55.** In Florida, phone **305-846-4811.**

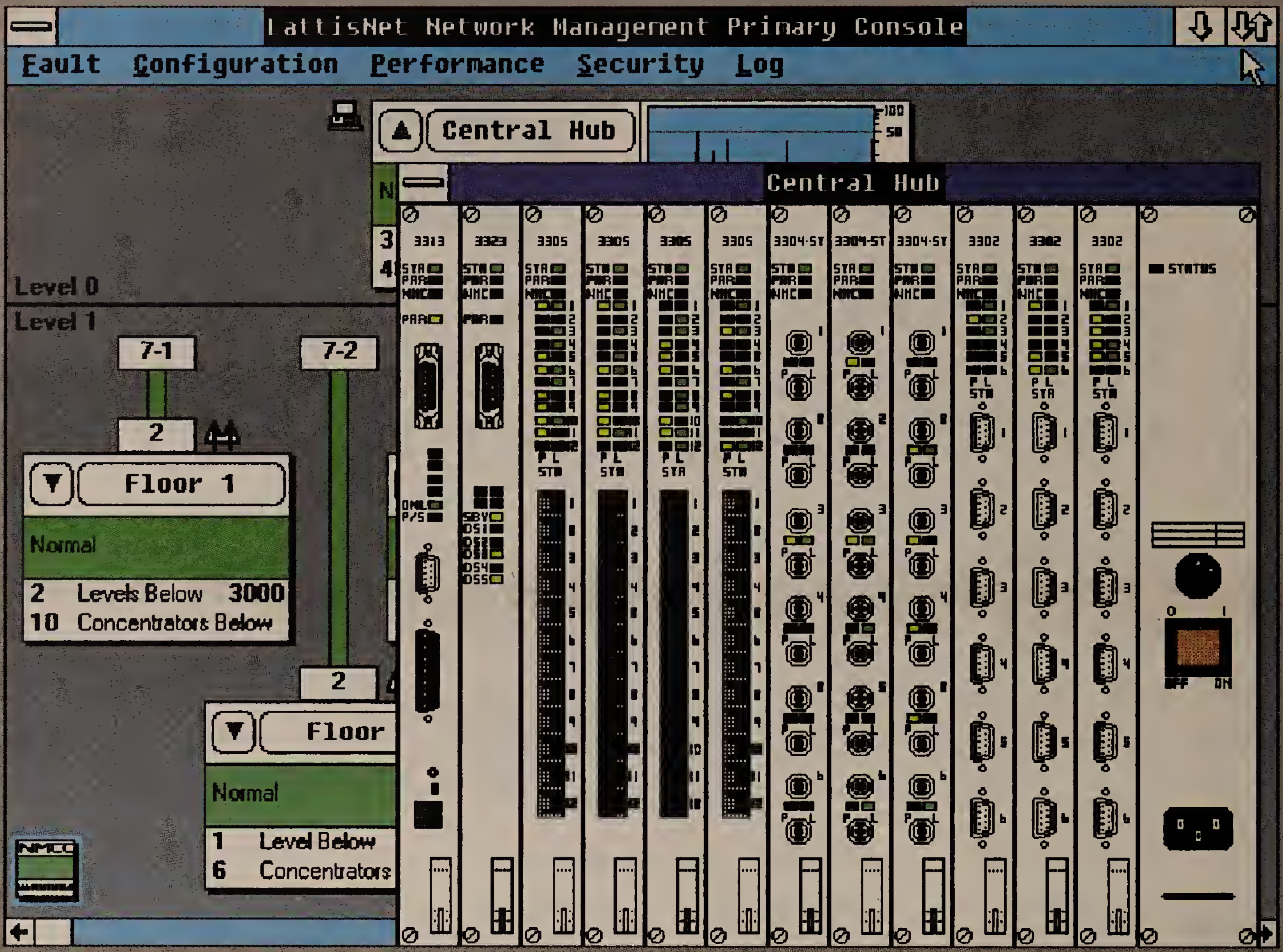
We think you'll agree—nothing around compares with Excalibur. And that's on the level.

RACAL
Racal-Milgo®

WE UNDERSTAND NETWORKING INSIDE AND OUT.™

©1990 Racal Data Communications, Inc. All rights reserved.

MAXIMIZE NETWORK UP-TIME



The Expanded View™ features a detailed, real-time display of a LattisNet® System 3000 concentrator.

IN REAL TIME.

The LattisNet Network Management system lets you maximize network up-time by monitoring, controlling and planning your network's physical layer – in real time – from a central control console. LattisNet Network Management automatically creates a real-time map of your entire network so you can monitor all or any part of your network at a glance. Network utilization data is updated continuously and built-in diagnostics automatically find and isolate faults, saving you time in troubleshooting and helping you keep your network up and running.

The Expanded View feature offers a detailed real-time display of your LattisNet concentrators, allowing you to manage individual network connections. Problem segments and nodes can be partitioned from the network to avoid catastrophic failures and maintain high service levels.

LattisNet Network Management lets you learn about the network from the network itself. User-definable thresholds let you determine acceptable activity and error levels for the network. If a threshold is crossed, the system alerts you immediately, keeping you one step ahead of potential problems. And best of all, LattisNet Network Management captures and stores vital information for future analysis and network planning.

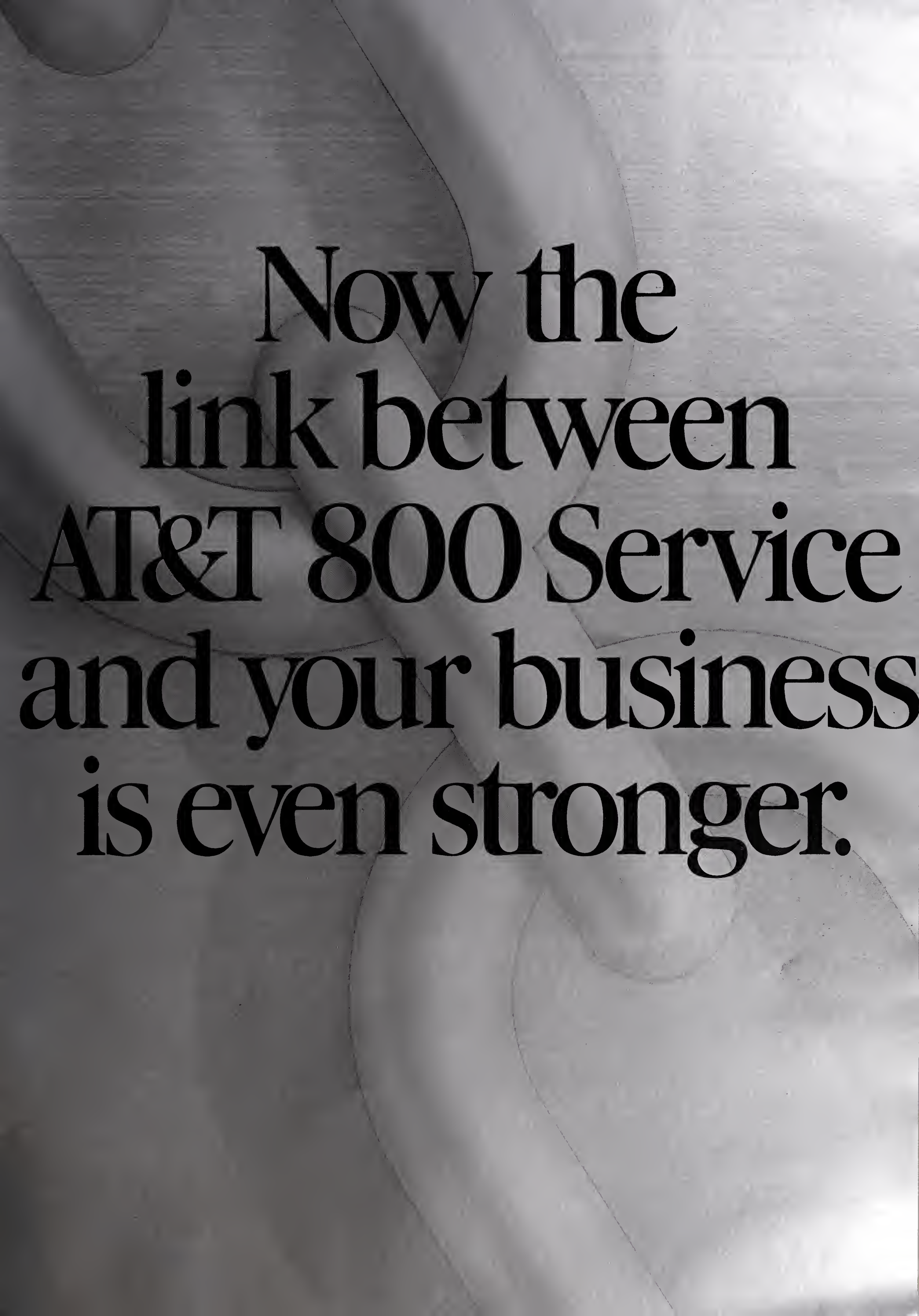
SynOptics
Communications, Inc.

To receive a free LattisNet brochure and storyboard dikette, call toll-free at (800) PRO-NTWK.

SynOptics Communications, Inc. 4401 Great America Pkwy., P.O. Box 58185, Santa Clara, CA 95052-8185

© 1989 SynOptics Communications, Inc. LattisNet is a registered trademark and SynOptics and Expanded View are trademarks of SynOptics Communications, Inc. Other brand and product names are trademarks or registered trademarks of their respective holders.

See the FAXNeT Form on Page 58



Now the link between AT&T 800 Service and your business is even stronger.

AT&T completes the 800 call completion chain, Egress.

Now virtually nothing can stop 800 calls from getting to you. Because Egress, the link between you and our Network, has been made virtually indestructible. Thanks to some of the most innovative software anywhere and our exclusive 800 Assurance Policy.

This critical link has been strengthened by two new automatic routing features that instantly redirect incoming calls around problems on a call-by-call basis. The first, Split Access Flexible Egress Routing (SAFER),* automatically reroutes calls to your location if your primary route is ever down.

The second, Alternate Destination Call Redirection (ADCR),* reroutes calls to a different location, across town or across the country. In case of service disruption, both options virtually guarantee call completion.

If you prefer more hands-on control, we have 800 Routing Control Service. From your own network terminal, you can react in real-time to changing traffic patterns, adapt to regional promotions, and cover emergencies or closings. There's also 800 Command Routing Service that, once you call us, redirects calls to a preprogrammed alternative route within 5 minutes.

The fact is, we're so committed to reliability, we guarantee it with the AT&T 800 Assurance Policy. Every domestic AT&T 800 customer is automatically covered.**

Now the company with more ways to get every 800 call through offers you more security than ever.

800 calls that get through.
Another AT&T advantage.

For more details, call your AT&T Account Executive.

AT&T
The right choice.

© 1990 AT&T
*Available to AT&T MEGACOM® 800 Service customers.
**Except intrastate basic 800 service.

LOCAL NETWORKING

PC AND TERMINAL-TO-HOST LANS, GATEWAYS AND MICRO COMMUNICATIONS PRODUCTS

Worth Noting

LAN-based electronic mail licenses are expected to increase in number from 32,000 in 1988 to 340,000 in 1994, according to International Data Corp., a market research firm in Framingham, Mass. Data base management system licenses are expected to increase from 137,000 to 320,000 over that same period.

Netnotes

Ungermann-Bass, Inc. last week announced an enhanced version of MacUWS, software that enables Apple Computer, Inc. Macintosh users to establish Transmission Control Protocol/Internet Protocol sessions with host computers. MacUWS 2.0 offers Digital Equipment Corp. VT-220, Tandem Computers, Inc. 6530 and TN3270 terminal emulation. TN3270 is a protocol that enables users to establish IBM 3270 sessions over a Telnet connection.

MacUWS 2.0, which runs on any Macintosh computer, is available now. The software costs $495 for an administrator's kit, which includes software that can be downloaded to multiple users. Each user license costs $450.

Ungermann-Bass can be contacted at 3900 Freedom Circle, Santa Clara, Calif. 95054; (408) 496-0111.

Network Computing Devices, Inc. (NCD) last week announced a 19% reduction in the cost of its NCD16e, a monochrome X Window System terminal with a 16-in. display. As of Dec. 1, the product costs $2,595, compared with its previous price of $3,200. The product has been shipping since May 1990.

For more information, contact NCD at 350 N. Bernardo Ave., Mountain View, Calif. 94043; (415) 694-0650.

UCLA carries SNA, TCP/IP over Token-Ring backbone

Fiber cabling scheme will connect 80 buildings.

By Tom Smith
Senior Writer

LOS ANGELES — The University of California at Los Angeles (UCLA) has embarked on the implementation of a dual-protocol 16M bit/sec IBM Token-Ring backbone network that will eventually connect 80 buildings and up to 15,000 end users on its campus.

The UCLA Campus Backbone Network, which currently connects 37 buildings with fiber-optic cable, supports IBM's Systems Network Architecture for administrative applications and the Transmission Control Protocol/Internet Protocol for academic applications.

The net, which is based on dual redundant rings, represents the first comprehensive campus cabling scheme at the university, according to Luis Llambias, campus network manager. In the past, LANs were linked on an ad hoc basis to other departmental LANs or computing resources such as mainframes.

When completed at the end of 1991, the backbone will connect as many as 15,000 users on Ethernet and Token-Ring LANs running a variety of protocols, including Digital Equipment Corp.'s DECnet and Novell, Inc.'s Internetwork Packet Exchange/Sequenced Packet Exchange.

Individual LAN segments that do not run TCP/IP or SNA in native mode use gateways for connection to the backbone.

The Token-Ring LANs are linked via IBM source routing bridges to the campus backbone. Ethernets are linked via IP routers to the backbone, Llambias said.

Academic users utilize TCP/IP to access an IBM host running the protocol.

Typical academic applications include scientific visualization, Llambias said.

(continued on page 23)

3Com offers LAT support with its TCP/IP software

SANTA CLARA, Calif. — 3Com Corp. this week will announce that it has bundled support for Digital Equipment Corp.'s Local Area Transport protocol into its Transmission Control Protocol/Internet Protocol terminal server software.

TCP/LAT Connection Service, which runs on 3Com's CS line of terminal servers, will enable the terminal server to simultaneously support LAT and TCP/IP sessions.

3Com previously offered terminal server software supporting TCP/IP, Open Systems Interconnection and Xerox Corp.'s Xerox Network Systems. In those implementations, however, only one protocol at a time could be supported.

Simultaneous access

The new TCP/LAT Connection Service, by contrast, will enable CS users for the first time to simultaneously access a TCP/IP host and a DEC VAX, for example, that supports LAT. 3Com licensed the LAT code directly from DEC, so users can be assured of compatibility.

The CS product family consists of the diskless CS/2000 and disk-based CS/2100, each of which supports 10 terminals, as well as the disk-based or diskless CS/1, which supports between four and 64 terminals.

In addition to support for both the LAT and TCP/IP protocols, 3Com enhanced the TCP/IP portion of the software to support the Simple Network Management Protocol (SNMP) and the Serial Line Interface Protocol (SLIP), which allows users to perform peer-to-peer communications for the first time.

Support for SLIP will enable a personal computer attached to the terminal server to perform tasks such as file transfers using TCP/IP's File Transfer Protocol, thereby enabling it to function as a peer for communications with a host.

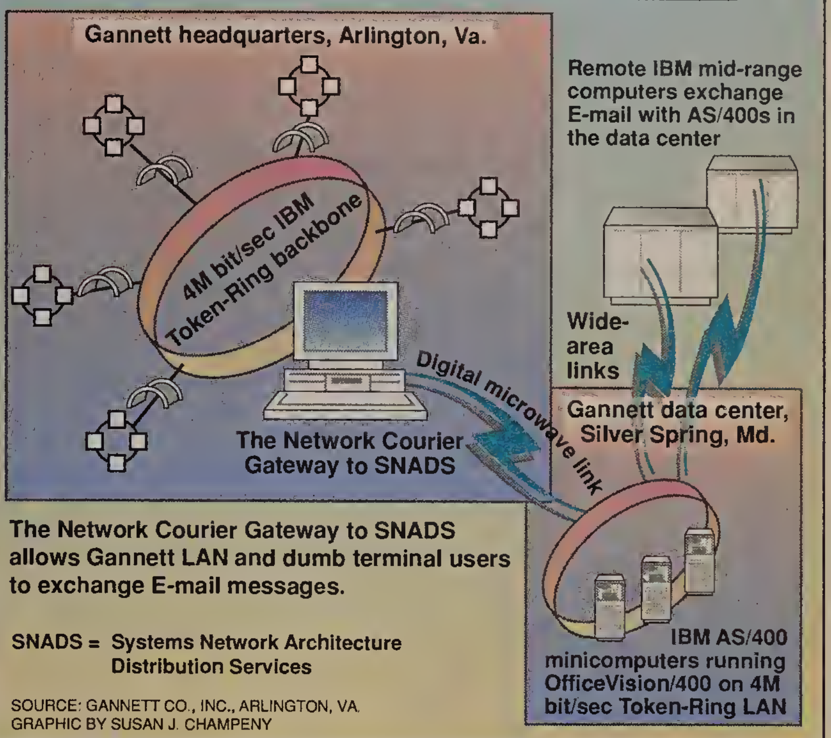
In the past, users could only communicate with a remote host using Telnet terminal emulation.

The new TCP/LAT Connection Service also includes an SNMP agent that will enable the terminal server to report management information to an SNMP management station.

The new software will be available in the first quarter of 1991.

License fees will cost $250 for single disk-based terminal servers and $300 for use with multiple diskless CS terminal servers.

E-mail ties Gannett LANs, AS/400s


Gannett headquarters, Arlington, Va.
4M bit/sec IBM Token-Ring backbone
The Network Courier Gateway to SNADS
Digital microwave link
Remote IBM mid-range computers exchange E-mail with AS/400s in the data center
Wide-area links
Gannett data center, Silver Spring, Md.
IBM AS/400 minicomputers running OfficeVision/400 on 4M bit/sec Token-Ring LAN

The Network Courier Gateway to SNADS allows Gannett LAN and dumb terminal users to exchange E-mail messages.

SNADS = Systems Network Architecture Distribution Services

SOURCE: GANNETT CO., INC., ARLINGTON, VA.
GRAPHIC BY SUSAN J. CHAMPENY

Gateway bridges gap between LANs, minis

Gannett implements Consumers Software E-mail, gateway to bolster its electronic messaging net.

By Tom Smith
Senior Writer

ARLINGTON, Va. — Gannett Co., Inc. has deployed an electronic mail gateway that allows electronic communications between its local-area network and IBM Application System/400 users.

Gannett is utilizing The Network Courier Gateway to SNADS, a Consumers Software, Inc. product that translates messages between Consumers Software's LAN E-mail product and OfficeVision/400, E-mail software that runs on IBM's AS/400.

The minicomputers use IBM's Systems Network Architecture Distribution Services (SNADS) as the protocol for communications between AS/400 and IBM System/36s and System/38s.

Together, the E-mail and gateway software enable the company's end users to swap messages across LANs and communicate with users on Gannett's existing minicomputer network.

In the past, end users supported on personal computer LANs and those supported by minicomputers could not communicate electronically, according to Jon Hosford, manager of financial and personal systems for Gannett, based here.

Gannett, which publishes about 85 newspapers, including *USA Today,* has eight servers on five 4M bit/sec Token-Ring LANs in its corporate headquarters. The rings, which support roughly 160 users, are linked to a 4M bit/sec Token-Ring backbone via source routing bridges.

Gannett's headquarters is linked via digital microwave to the corporate data center in Silver Spring, Md., 13 miles north of headquarters. In addition to IBM mainframes, the data center houses three Token-Ring LANs, one of which links the mainframes to three AS/400s running circulation, accounting and E-mail applications.

> The AS/400s swap E-mail with other AS/400s, as well as System/36s and System/38s.

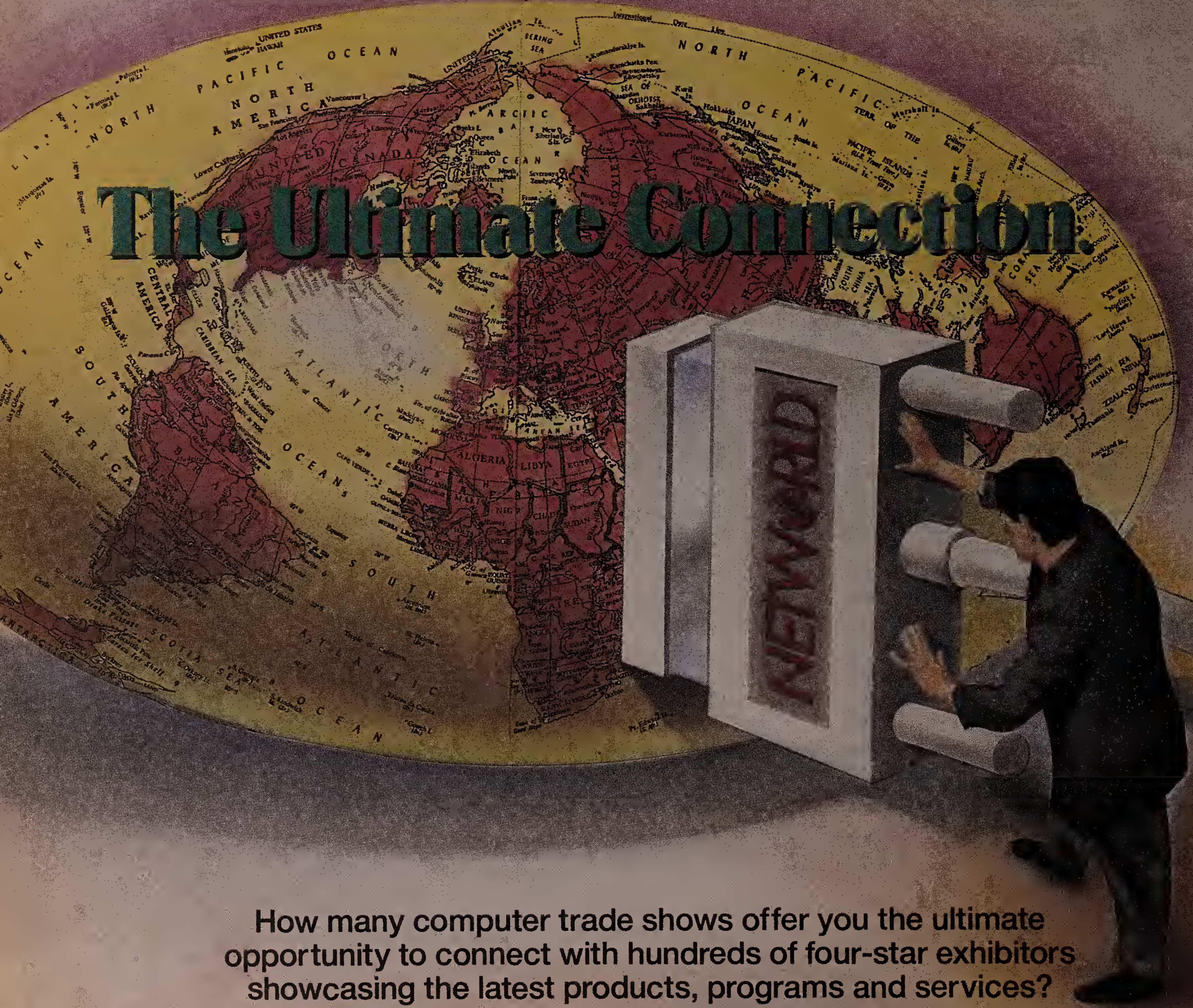
▲▲▲

The AS/400s swap E-mail with other AS/400s, as well as System/36s and System/38s, at remote sites via SNADS.

Gannett began searching in 1989 for an E-mail system that would support LAN communications and enable it to link its growing number of LAN users with its installed base of *USA Today* employees on dumb terminals supported by the minicomputers, Hosford recalled.

"*USA Today* had a very viable, functioning nationwide network of people communicating with one another successfully," he said. "If we were going to build

(continued on page 23)



How many computer trade shows offer you the ultimate opportunity to connect with hundreds of four-star exhibitors showcasing the latest products, programs and services?

And how many provide a Seminar Program with a direct connection to the best in the industry eager to assist with all your networking and connectivity needs?

Only one. **NetWorld 91.** The Ultimate Connection.

NetWorld Boston
Hynes Convention Center
February 12-14, 1991

For information on advance registration call today.

800-444-3976

NetWorld is produced by **Bruno Blenheim Inc.**, trade show management, Englewood Cliffs, NJ · **201-569-8542**

NetWorld Expositions in the U.S.A. are owned, produced and managed by Bruno Blenheim Inc.
NetWorld is a servicemark of Novell, Inc. licensed exclusively in the U.S.A. to Bruno Blenheim Inc.

Gateway bridges LANs, minis

continued from page 21

an E-mail internetwork, we had to build something compatible with what they already had."

The company looked to Consumers Software because of its ability to provide not only LAN-based E-mail, but also the gateway connectivity with the E-mail application running on its AS/400s, Hosford explained.

The company was impressed with the functionality of Consumers Software's LAN E-mail pack, The Inter-Network Courier, as well as the gateway, The Network Courier Gateway to SNADS, which is manufactured by Link-Age, Inc. of Toronto and resold by Consumers Software.

"We found their product to be stable, simple and functional," Hosford said.

The gateway software runs on a dedicated personal computer on the Token-Ring backbone and works in conjunction with communications software, which is part of The Inter-Network Courier.

The communications software is responsible for shuttling E-mail between "post offices" on local and remote LANs, as well as allowing remote users to dial into a post office to retrieve E-mail messages. The gateway software performs the conversion between message formats and puts the data in SNADS format for transmission over the SNA link.

"We now transfer about 10,000 messages through that gateway monthly," Hosford said. "I can now pick out somebody remote, local or on the other side of the SNADS gateway; they all look the same to me. I need not concern myself with their location."

Messages being exchanged range from executive communications to the transfer of spreadsheets, Hosford said. In the past, swapping spreadsheets typically required sending packages via overnight mail, which was significantly more time-consuming and expensive.

The only other product that was evaluated for the application was from cc:Mail, Inc., which would have required installing mainframe software and shifting E-mail to that mainframe. That option was unacceptable.

"We prefer to do text processing on microcomputers," rather than using more expensive mainframe CPU cycles, Hosford said.

Gannett also recently went live with facsimile gateway software from Consumers Software that enables LAN users to send faxes from their desks by addressing them in the same manner in which they address E-mail messages.

Although Gannett is considering a possible addition of X.400 to its E-mail application, it is not a high priority.

"We have what we need," Hosford said. "There's no advantage to changing it." ◻

UCLA carries SNA, TCP/IP

continued from page 21

Administrative users, on the other hand, access a separate IBM host via the SNA protocol for applications such as payroll, student records and accounts receivable.

More general applications for which the backbone is used include homegrown electronic mail, as well as remote logon and file transfer.

End users at the university can also access regional and national research networks, such as the Internet, from any node on the network.

UCLA is using an early release of IBM's NetView that supports the Simple Network Management Protocol (SNMP) to manage the entire network, Llambias said.

From a single NetView console, a net manager can monitor and control TCP/IP nodes using the SNMP protocol and manage SNA devices using native NetView commands.

Llambias declined to specify how much the project would cost but said the backbone cabling alone represents a multimillion-dollar undertaking.

IBM donated $5 million worth of Token-Ring hardware and software.

For the first time, "this network will provide equal, distributed access to all on- and off-campus resources to everyone — faculty, students and staff," Llambias said. ◻

Mix network signals any way you want with the new Magnum100 Fiber-Optic Backbone Network. The first to transport 16 different LAN and data protocols simultaneously and transparently on a 100 Mbps ring.

Combine Ethernet, 4/16 Mbps Token Ring, IBM 3270, 5080 and AS/400, ARCnet, LocalTalk, RS-232, RS-449, T1, Wang, and more. And unite all your LANs and personal computers, minis and mainframes, digitized voice and video on the same high-capacity, interference-free fiber network.

Signals travel safely with the unmatched protection of Magnum100's dual counter-rotating rings. And LightWatch network management software provides the network control you need.

Call **(818) 709-6000** and start sending mixed signals.

Magnum100

100 Megabit Fiber-Optic Backbone Network
Ethernet, 4/16 Mbps Token Ring, IBM 3270, 5080, AS/400
ARCnet, LocalTalk, RS-232, RS-449, T1, Wang
Fail-Safe Dual Counter-Rotating Rings
LightWatch Network Management

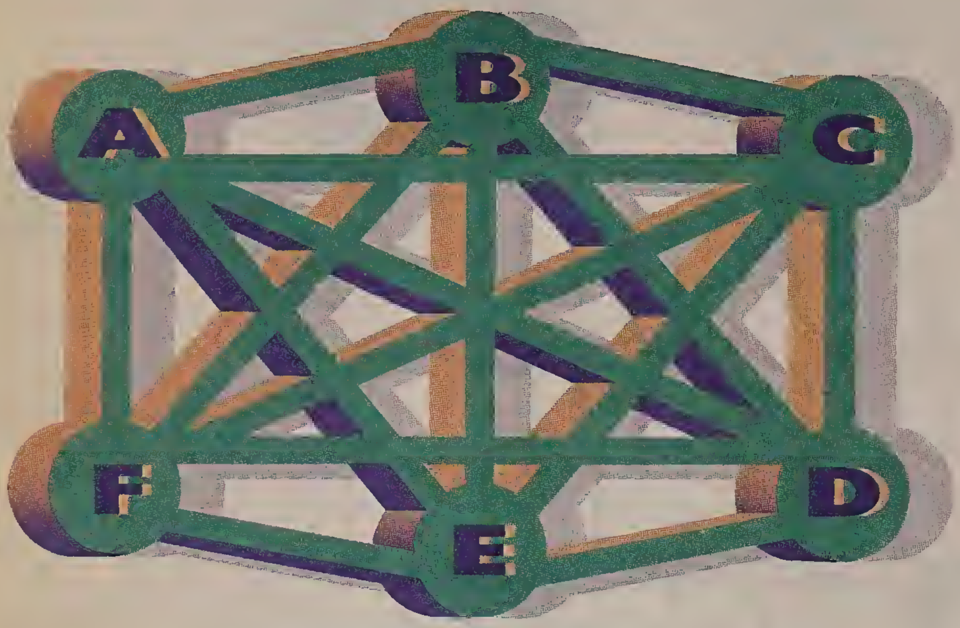
FOR SERIOUS NETWORKS

Fibermux. Fiber-Optic Backbones. We're Serious.

Copyright © 1990, Fibermux Corporation • 9310 Topanga Canyon Blvd Chatsworth, CA 91311 • (818) 709-6000 • FAX (818) 709-1556

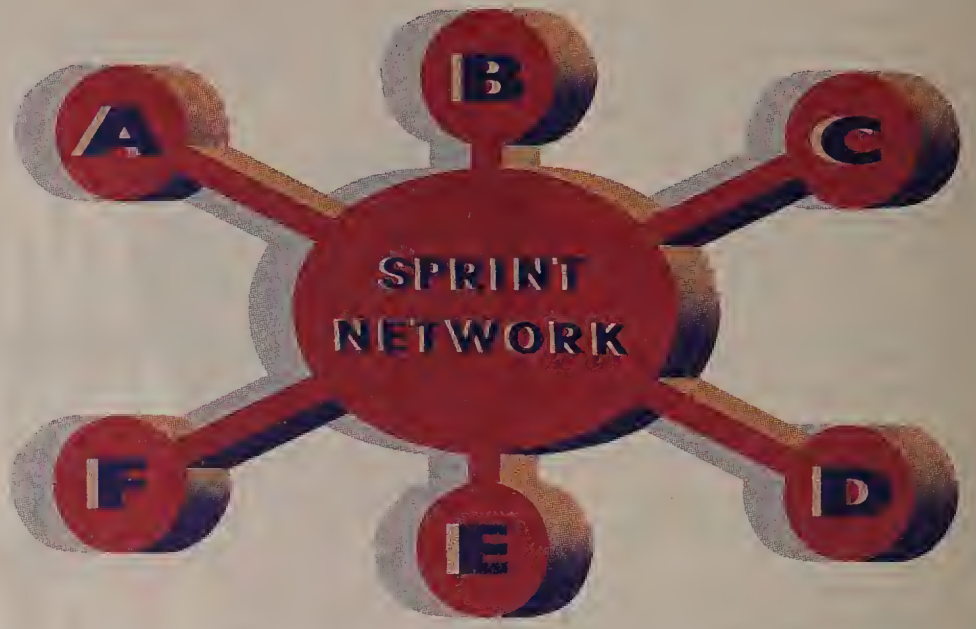
See The FAXNeT Form on Page 58

Traditional LAN Internetwork



THESE LANS ARE THEIR LANS.

SprintNet LAN Reach X.25



THESE LANS ARE OUR LANS.

UP TILL NOW, the conventional way to build a LAN internetwork was to use private lines. And to connect each LAN to every other LAN or host. The management issues were a nightmare. And the costs were even worse. Which is why most people only connected a few of their LANs. Or none at all.

But now there's a simple, cost-effective solution. Sprint LAN Reach℠ X.25. To begin with, each LAN has only one point of connection. From that one point, any user on any LAN can talk simultaneously to any other user. And have full connectivity to mainframes, minis, databases and X.400 e-mail services. In a wide range of computing environments, including IBM.®

With Sprint LAN Reach X.25, you get a meshed network without the cost of redundant lines. And you get comprehensive management of LAN interfaces, communication lines, and modems. As a result, you'll have lower management overhead. You also get the inherent reliability that our automatic rerouting offers.

When you work with US Sprint,® you get a lot more help than you'll find anywhere else. Because SprintNet℠ is the largest public data network in the world. (In the past, we were known as Telenet.®) And we have the resources to give you a single-vendor source for design, implementation, and management of end-to-end network solutions.

As an extra advantage, there's even a free installation offer.

And LAN Reach X.25 is just one of our family of LAN services. Soon, our LAN Reach℠ 56 will be available. So you can enjoy all the benefits Sprint offers on our switched high-speed network.

If you'd like to see exactly how LAN Reach X.25 fits into your specific environment, call 1-800-735-3299.

In just a few minutes you'll have a complete package of information in your fax machine.

And we'll show you the best possible way to build an enterprise-wide network.

With a lot less lines. And a lot more help.

US Sprint.
IT'S A NEW WORLD℠

© 1990 US Sprint Communications Company Limited Partnership. ® IBM is a registered trademark of IBM Corporation.

MANAGEMENT STRATEGIES

MANAGING PEOPLE AND TECHNOLOGY: USER GROUPS AND ASSOCIATIONS

Worth Noting

"As more top executives ask for car phones, pocket phones and other exotic equipment, they'll become more cognizant of the strategic advantages technology can provide to their bottom lines."

Lionel Gillerman
Manager of network technology
McDonnell Douglas Aerospace
Information Services Co.
Cypress, Calif.

Association Watch

Netrix Corp. recently formed a user group for companies that have installed Netrix's 1-Integrated Switching System (ISS) product.

The purpose of the user group is to provide a forum for them to influence Netrix's product development and strategic direction, exchange application information and networking ideas, and discuss emerging wide-area networking technologies.

The Netrix 1-ISS switch combines X.25 packet switching, circuit switching and subrate and T-1 multiplexing in a single product.

For more information on the user group, call (703) 742-6000.

SHARE, Inc. recently announced its new board of directors for the 1990-92 term.

The new members are: president, Sandy Moy, University of Washington; vice-president, John Chapman, Amoco Corp.; secretary, John Bevis, University of Florida Northeast Regional Data Center; and treasurer, Lois Hoyer, Northern Trust Bank.

Also elected as directors were Anne Calouri, U.S. Army Systems Software Center; Bill Choate, Emory University; Cynthia Combs, United Services Automobile Association; Tom Rupsis, Johns Hopkins University Applied Physics

(continued on page 26)

Children's Hospital in Pittsburgh

Hospital net offers wide access to patient data base

All departments, clinics can work with same data.

By Maureen Molloy
Staff Writer

PITTSBURGH — Children's Hospital of Pittsburgh has built a hospitalwide network that gives employees in different departments and outpatient clinics access to a common data base of patient information.

Nina Virone, director of computerized information systems, said the AT&T Information System Network (ISN) has enabled the hospital to support a growing number of end users and handle the influx of personal computers and local-area networks.

It gives all departments and 51 outpatient clinics access to a single pool of information, including medical histories as well as scheduling and billing data residing on a Digital Equipment Corp. VAX in the hospital's data center.

When a patient checks into the orthopedic outpatient clinic, for instance, scheduling and registration information is automatically recorded on the VAX. Then, as the patient's stay progresses, other departments such as nursing, pharmacy and billing can access the patient file to update information.

> The net gives all departments and clinics access to a single pool of information.
>
> ▲▲▲

Some departments and clinics in the hospital use LANs, while others use individual personal computers or terminals. The LANs, personal computers and terminals are linked to ISN nodes using twisted-pair wiring, and the ISN nodes are interconnected by a fiber-optic Ethernet backbone.

Twisted-pair wiring runs from individual workstations and LANs into wiring closets on each floor of the hospital's two buildings. Fiber cabling runs from the wiring closets to ISN nodes, as well as between buildings.

> ISN has "given us the ability to have total control over our network."
>
> ▲▲▲

Children's Hospital's integrated approach to information management is the result of careful planning. When the hospital's data center was relocated four years ago to a new $92 million hospital tower, there were about 60 users accessing the center's four stand-alone mainframes. Today, there are more than 300.

"Using ISN, we were able to easily connect all the additional users," Virone said. "It's given us the ability to have total control over our network."

ISN restores order to data processing, which has been decentralized by the influx of personal computers and minicomputers. Because ISN links this equipment, the DP manager can centralize control, making sure all decision makers are working with the same data.

The wiring system supporting

(continued on page 26)

Reporting structures evolve with network

Changing needs of Prince William County net leads to organizational shifts for telecom group.

By Wayne Eckerson
Senior Editor

WOODBRIDGE, Va. — Since the 1984 divestiture of AT&T, the government of Virginia's Prince William County has been searching — like many organizations — to find the best home for telecommunications within its organizational structure.

Over the past six years, the county's telecommunications group has reported to operations and existed as a separate division. Now it is combined with data communications under the umbrella of information systems (IS).

These changes were prompted by several major network projects that enhanced the county's communications and data processing capabilities and reflect the evolving role of telecommunications in the county government.

"Virtually all our decisions stemmed from a desire to bring focused management to telecommunications, capitalize on our technology investments and maximize our operating efficiencies by eliminating overlapping areas of responsibility," said Dennis Gardner, director of the office of management systems for the county.

Net group evolution

There are currently four divisions that constitute Prince William County's 81-person office of management systems: telecommunications, computer operations, the information center and application development (see graphic, page 27).

In 1984, telecommunications reported to the county's General Services division, which manages such functions as the county's motor pool and interdepartmental mail delivery.

At that time, telecommunications consisted of eight people whose responsibility was simply to administer phone service, which the county purchased from the local exchange carrier, Contel Corp.

In 1985, however, the county launched a large campaign in order to raise money to construct a

(continued on page 27)

REVIEW

BY ERIC SCHMALL

Tapes offer net managers easy way to stay current

Needs Analysis — Executive Edition, Narrated by Jim Jewett (Nashville: Telco Research Corp., 1988), $9.95.

Needs Analysis — Skillbuilder Edition, Narrated by Jim Jewett (Nashville: Telco Research Corp., 1989), $9.95.

Profitable Partnering: How Telecommunications Professionals Can Achieve Extraordinary Personal and Organizational Success, Jim Jewett (Nashville: Telco Research Corp., 1988), $19.95.

If you're frustrated by the amount of reading you have to do to stay current in this industry, consider this alternative: audiotapes.

Telco Research Corp., a Nashville-based company that develops telemanagement products, has produced three audiotapes that can help network managers improve their effectiveness on the job.

Two of the tapes contain advice from a number of industry experts who explain how to assess and address end users' network needs. The third explores keys to success as a network manager.

(continued on page 26)

Schmall is a network systems manager for an insurance holding company.

Net offers wide access to data

continued from page 25

the ISN net is based on AT&T's Systimax Premises Distribution System (PDS). It supports virtually all voice and data communications devices, such as telephones, switches, computer nets, facsimile machines, and video and imaging equipment.

Virone said ISN and PDS make a cost-effective combination that enables her department to easily make changes in the network without assistance from equipment vendors. It also cuts costs by allowing entire work groups to pool expensive resources such as printers, hosts, transmission facilities, modems and protocol converters.

The hospital can add a new device or LAN to the ISN by providing a twisted-pair connection to a wiring closet. Previously, Virone had to work with vendors to make a location change or new connection.

Children's Hospital has also implemented an interactive AT&T video kiosk that enables visitors, employees and patients to locate various clinics within the hospital. Users are prompted to touch the kiosk's screen to indicate the place they are seeking. A map then appears on the screen to direct them, and the kiosk prints written directions to lead them to their destination.

The hospital plans to use the kiosks to present training programs and to market various hospital services.

Association Watch

continued from page 25

Lab; and David Thewlis, Kaiser Permanent Medical Care Program.

The remaining members of the board of directors are: director, Roger Watt, University of Waterloo; past president, Cecilia Cowles, Cornell University; executive director, Lynne Schwartz, Smith, Bucklin and Associates, Inc.; and IBM liaisons Charles Lyman and Hal Logan.

SHARE is a nonprofit organization whose members are users of complex IBM systems. Its mission is to improve the effectiveness of members' information systems by promoting mutual support and influencing IBM's products and services.

Contact SHARE at (312) 644-6610.

Tapes offer way to stay current

continued from page 25

Needs Analysis — Executive Edition contains some general information about how to identify user problems and translate user requirements into useful net applications. This tape will be most helpful to junior analysts or senior executives who have been assigned high-level telecommunications responsibility.

The *Skillbuilder Edition* gets into the details of how to assess end-user needs. It provides a step-by-step explanation of how to identify end-user problems and requirements and then formulate constructive solutions. The net manager will find this tape, compared with the others mentioned, much more useful.

Jim Jewett, founder of Telco Research and now a frequent speaker on management and network issues, acts as the narrator for both tapes, which last about 35 minutes each. Jewett gives a brief overview of the topic and then introduces experts (net managers, consultants and academicians) who address the topic from different points of view.

All of the industry experts are reasonably articulate and draw their conclusions from a wealth of experience. They discuss a variety of topics involved in building a needs analysis, including how to identify a user's true problem and how to build a plan to solve it. They also provide advice on how to create an awareness among senior staff and users that telecommunications is not just an isolated, expense-ridden utility, but a powerful instrument that can foster the organization's success in the marketplace.

In the third tape, titled *Profitable Partnering,* Jewett describes his secrets for personal and professional success. He drives home three main themes, which he illustrates with examples from his own experience as a successful entrepreneur.

The first theme is that all individuals have the potential to be successful. The second describes a technique called "partnering," in which network managers team up with users, vendors, colleagues and even adversaries to solve network problems or develop new products and services. The final theme centers on using network technology to gain a competitive advantage.

> In the third tape, Jewett describes his secrets for personal and professional success. He drives home three main themes, which he illustrates with examples from his own experience.
>
> ▲▲▲

The process of listening rather than reading about these subjects proves to be a refreshing alternative. However, the tapes require a good deal of concentration and uninterrupted time. The subjects are best absorbed by someone who is willing to listen at least twice and take notes.

These tapes and others on similar topics are available from Telco Research at (800) 347-7747 or (615) 320-6169.

It's the fastest
But it will never cat

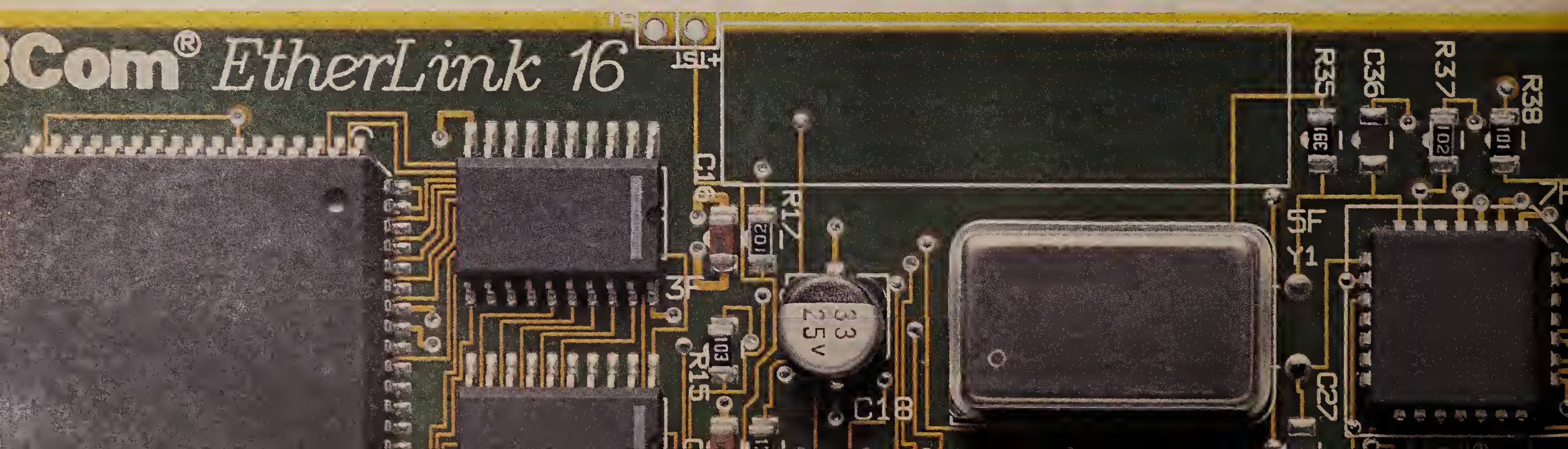
You can go fast. You can go safe. Just not together. Until EtherLink® 16.

This 16-bit Ethernet network adapter is up to 90 percent faster than its major competitors.* Yet it runs with a lifetime warranty.

You can use it with your IBM PC, XT, AT, PS/2 Model 25 or 30 and compatibles, as well as EISA computers. And it's ready to run on NetWare, LAN Manager and 3Com® 3+Open.™

What's more, EtherLink 16 is speedy to install,

*An independent laboratory, LanQuest Group, did the testing, and you can get a copy of their glowing report on speed by calling us at 1-800-NET-3Com. You can also request the data on reliability, and learn why that of two million 3Com adapters in use, 99.5 percent have never needed repair.



Structures evolve with net

continued from page 25

private voice network. According to Gardner, the county decided to assume control of its phone communications because service from Contel was unreliable and prone to outages. In addition, residents in the western part of the county had to make long-distance calls to speak with officials at county administrative offices here.

By 1986, the county had installed Northern Telecom, Inc. Meridian SL-1 private branch exchanges in administrative offices throughout the county and connected them via a private microwave backbone.

The network was primarily designed to support voice communications, although it also supported remote access to the county's Hewlett-Packard Co. host processors, Gardner said.

New office created

To manage the new network, the county decided to create an office of telecommunications and appoint a director of communications. The new director would also manage the county's growing radio repair and maintenance operation.

"The multimillion-dollar project warranted a person who was a telecommunications expert, which the director of General Services was not," Gardner said.

However, by 1988, the voice network was becoming overtaxed by the growing number of county workers dialing through the PBX to access applications on the host processors here.

It became obvious that telecom and IS shared responsibilities and functions could be consolidated.

▲▲▲

"Some people would stay at a data terminal all day, which would tie up one port on the PBX," Gardner said. "We were running out of dial tone on the PBX."

As a result, the county again embarked on a capital improvement campaign, this time to build a data network comprising numerous local-area networks and a wide-area backbone.

The county contracted AT&T to implement Integrated Services Network (ISN) packet switches in major sites in the county. Each ISN switch supported one or more AT&T Starlan LANs. The switches were linked via T-1 circuits across the county's microwave backbone or via 56K bit/sec circuits from Contel.

With the new data network, it quickly became obvious that the telecommunications and IS departments shared many responsibilities and certain functions could be easily consolidated, Gardner said.

"We were pulling parallel sets of wires [for voice and data] and putting two punch-down blocks next to each other in wiring closets," Gardner said.

"In addition, there is great similarity between a PBX and a packet switch," he added.

As a result, the county transferred several data communications experts from IS to telecommunications. It also downsized telecommunications from a department to a division under the direction of the office of management systems.

The consolidation enabled the county to save money by replacing the high-level position of telecommunications director with a division chief.

The telecommunications director had previously vacated that position for a job as the county's budget officer.

To aid the consolidation, the county now cross-trains members of its telecommunications department to become fluent in both voice and data technologies, Gardner said.

Future plans

For the future, Gardner said he expects that voice and data communications will remain in the same division and will probably be joined by video specialists.

"It's almost impossible now to segregate digital voice, data and video functions," he said. "They use the same common carriers and distribution systems."

By placing telecommunications under IS, Prince William County is typical of most companies.

According to a recent survey of nearly 560 network managers conducted by *Network World* and TFS, Inc. of Westford, Mass., a majority of firms (62%) have grouped network departments within IS.

This is a sharp rise from predivestiture days, when most network staffs reported to nontechnical departments, such as operations, administration and finance. ◼

Virginia's Prince William County Office of Management Systems

Divisions and their responsibilities

Telecommunications:
Responsible for managing the county's private backbone voice and data network, as well as radio communications for police, fire and rescue operations; 19 employees.

Information center:
Responsible for LANs and PC support; 9 employees.

Computer operations:
Manages the county's data center and host communications; 18 employees.

Applications development:
Creates applications and administers central data bases; 35 employees.

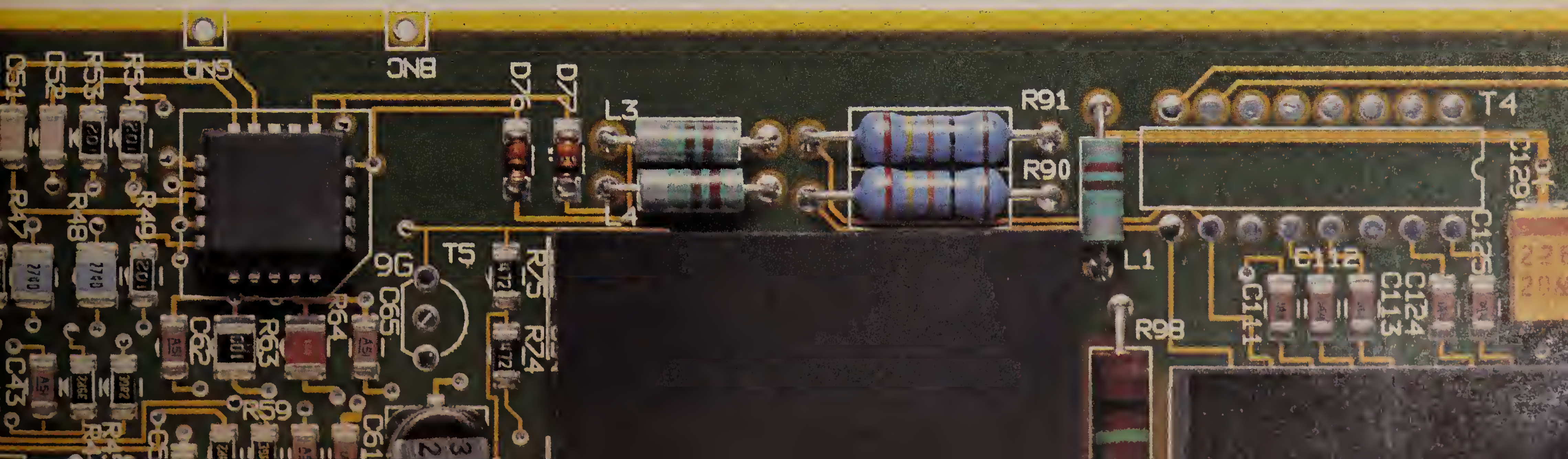
GRAPHIC BY SUSAN J. CHAMPENY

board available.
ch up to its warranty.

because there are no jumpers to slow you down.
But why not see for yourself?
Just call **1-800-NET-3Com** Dept. D6556 for the name of your nearest 3Com reseller.

3Com®
We network more types of systems to more types of systems.™

©1990 3Com Corporation, 5400 Bayfront Plaza, Santa Clara, CA 95052. Telephone (408) 764-5000. 3Com, 3+Open, EtherLink and the 3Com tagline are trademarks of 3Com Corporation. IBM, XT, AT and PS/2 are trademarks of International Business Machines Corporation. NetWare is a registered trademark of Novell, Inc. LanQuest is a trademark of LanQuest Group.



Setting up an overseas network shouldn't be an adventure.

What may be foreign to you is familiar to us. So we can help you avoid common pitfalls – and help you feel more comfortable – when your company needs to communicate with strategic locations overseas.

We've specialized in international communications services for over a century. And today we meet the dedicated and switched networking needs of customers in every sector – from small businesses to the U.S. Department of State.

We know our way around, all around the world. We have operating agreements, for example, with the administrations of more than 80 nations. From Austria to Zimbabwe, we know how to get things done with people who do things differently.

We'll take complete end-to-end responsibility for your private line or network. We'll custom engineer your system, provide the equipment and access arrangements you need, and install and maintain it. On our site or yours.

You can choose from a complete selection of digital and analog WorldCom services in a wide range of speeds for all of your voice, data and video transmission needs.

Our global system (including one of the world's most comprehensive portfolios of fiber optic channels) provides route, facility and node diversity with redundancy for extra reliability.

If you plan to venture overseas, expert help is nearby. Contact Ron Spirig, VP North American Sales, 800-733-3755 for more information about the international communications specialists.

WorldCom

THE INTERNATIONAL TELECOMMUNICATIONS SPECIALISTS • A TELE COLUMBUS COMPANY

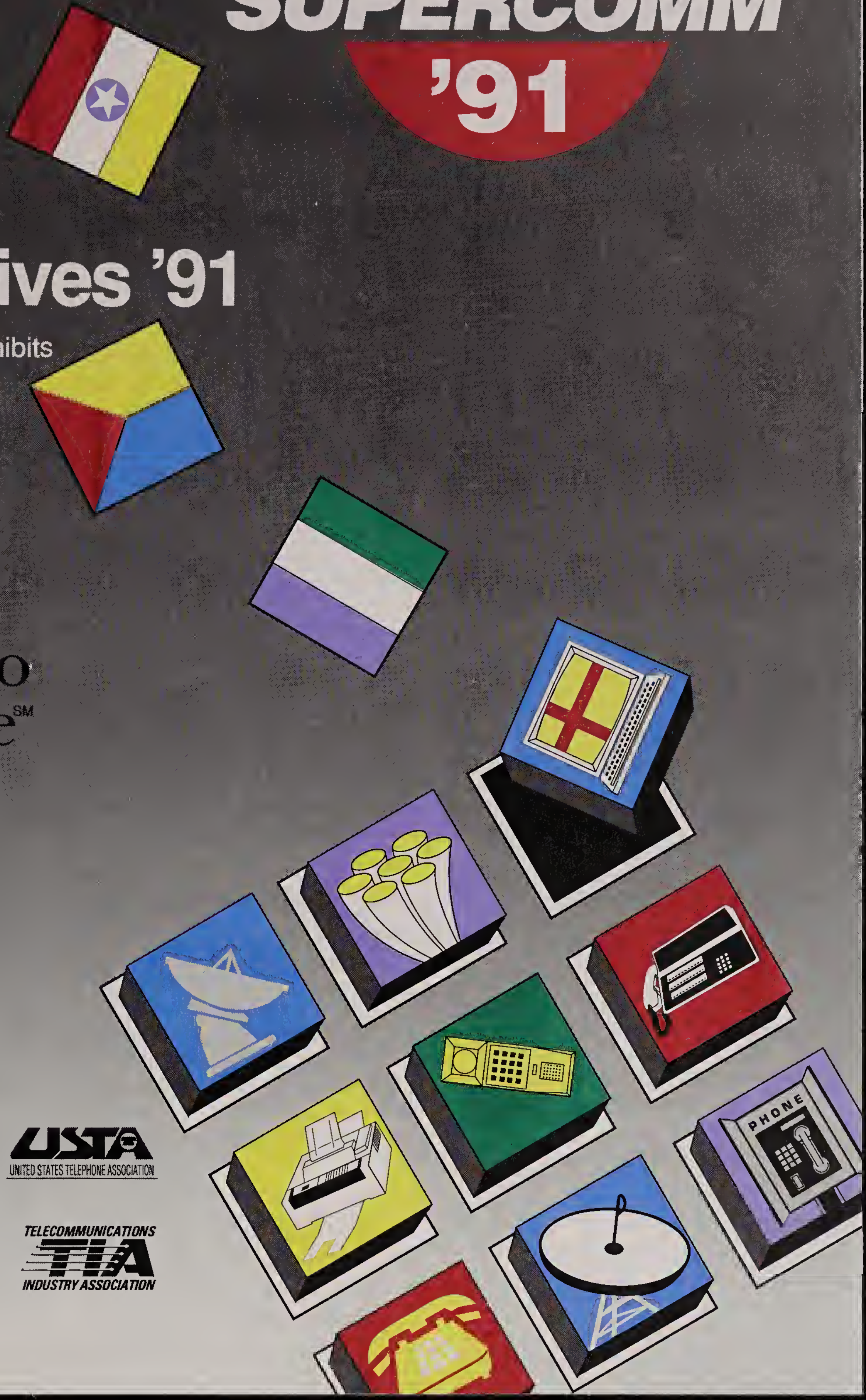
See The FAXNeT Form on Page 58

SUPERCOMM®
'91

Introducing:

Fiber Perspectives '91

Featuring Forum and Exhibits
for Managing Transitions



Gateways to Knowledge℠

SUPERCOMM '91
International
Conference and
Exhibition

March 18-21, 1991

George R. Brown
Convention Center
Houston, Texas

USTA
UNITED STATES TELEPHONE ASSOCIATION

TELECOMMUNICATIONS
TIA
INDUSTRY ASSOCIATION

SUPERCOMM® '91

SUPERCOMM '91
International
Conference and
Exhibition

March 18-21, 1991

George R. Brown
Convention Center
Houston, Texas

The SUPERCOMM® '91 International Conference and Exhibition opens your gateways ... to knowledge ... to opportunities ... to the future. As the most extensive business and technical look at today's fast-changing industry, SUPERCOMM '91 brings you more seminars, panels, exhibits, tutorials and special presentations than any other annual telecommunications event in the world. This year's SUPERCOMM features 52 free sessions and nearly 500,000 square feet of free exhibits from today's leaders in technology.

> Southwestern Bell is featuring its customized display "Horizons" ... unique telecommunications applications designed specifically for the fields of health care and education. Such applications as medical imaging and medicinal consultation in health care, and distance learning and PC-to-PC networking in education are already being used in the field today.

Plus, we've added another first: The all-new "Fiber Perspectives '91" – Featuring Forum and Exhibits for Managing Transitions. Keynote luncheons will open each day's program Tuesday through Thursday, followed by three simultaneous tracks and a dozen breakout sessions on fiber optics and outside plant.

We're also welcoming several new international neighbors to the SUPERCOMM roster: the Pacific Telecommunications Council (PTC), Caribbean Telecommunications Council (CTC) and a 100-person delegation representing the Association of Telephone Companies in Finland.

On Tuesday, you can find out firsthand what's shaping telecommunications in the Pacific Rim from the PTC. Based in Honolulu, the Council brings a day-long program covering activities and developments in Asia-Pacific telecommunications, focusing on facilities, services, and its markets. Wednesday, the CTC is sponsoring a conference on international investment and cellular in rural applications in its region, as well as disaster recovery and international marketing.

Come to SUPERCOMM '91 and survey thousands of products and services. Get up-to-date facts on technical, operational, and management issues. Share your knowledge and expertise with more than 15,000 industry professionals from the U.S. and around the world, including nearly 500 exhibiting companies. Every branch of the telecommunications industry will be participating. Don't miss out!

Highlights for the Industry Event of 1991.

What to see. What to do. It's a challenge. Especially when you consider that SUPERCOMM '91 offers the broadest series of program sessions in the industry, as well as the world's largest annual telecommunications exhibition. To get you started, we've mapped out some points of interest you'll want to include when planning your itinerary.

500,000 Square Feet of Free Exhibits Tuesday to Thursday — No Exhibits Monday.

SUPERCOMM's track record is going strong. For the fourth year in a row, exhibit space has grown dramatically and it's selling out earlier than ever!

Tuesday through Thursday, you can walk through almost 500,000 square feet of high-tech displays and hands-on demonstrations. Nearly 500 free exhibits in all!

Three Valuable Presentations, All Free.

Tuesday, FCC Chairman Al Sikes will open with his keynote address on telecommunications in a changing world.

Wednesday, Northern Telecom will open with a presentation on its view of the future trends and directions in telecommunications, including the move to fiber and wireless technologies. The program will review global activities affecting the public network and the speed with which new features are delivered to customers whose needs are rapidly changing.

Thursday, official publishers *Telephony* and *Network World* will host a panel discussion on local and interexchange carrier issues.

Moderator: *Network World* Publisher Gary Beach.

Who We Are:

USTA
UNITED STATES TELEPHONE ASSOCIATION

Based in Washington, D.C., USTA represents approximately 1,100 local exchange telephone companies throughout the United States.

TELECOMMUNICATIONS TIA INDUSTRY ASSOCIATION

With over 600 members, TIA is the largest association in the United States representing manufacturers and suppliers of telecommunications equipment and services. TIA has offices in Chicago and Washington, D.C.

Attend Seminars and Lectures Monday through Thursday.

SUPERCOMM '91 is offering 52 free sessions over four solid days. Plus, three-hour tutorials Monday at $75 each on ISDN and wireless. And moderately priced conferences organized by the Pacific Telecommunications Council and the Caribbean Telecommunications Council on Tuesday and Wednesday.

Monday's Your Primer for the Week.

Morning and afternoon primers will cover everything from telecommunications buzzwords and fiber optics to ISDN and LANs/MANs. These four primers are free and you can't afford to miss even one to help you prepare for the rest of the week's sessions.

Spotlighting Industry Experts.

Find out what the industry's experts have to say by attending three afternoon spotlight panels.

Monday, it's *"Telecommunications Research"* hosted by Allen R. "Mike" Frischkorn, President of TIA.

Tuesday, it's *"End Users and Local Carriers"* moderated by USTA President John Sodolski, with participants from the Boards of the International Communications Association and USTA.

Wednesday, enjoy *"New Horizons for Telecommunications in Education,"* a discussion of applications and opportunities, hosted by Southwestern Bell.

Insight from SUPERCOMM '91 Co-Sponsors USTA and TIA.

This year's focus is on a multitude of telecommunications issues to educate and generate ideas on two different educational levels. The first level includes comprehensive technical and non-technical seminars, practical applications-oriented programming sessions – all free from SUPERCOMM '91.

The second level includes a new addition to our roster: "Fiber Perspectives '91" – Featuring Forum and Exhibits for Managing Transitions and co-sponsored with *Telephony.* Tuesday and Wednesday, starting with a luncheon address, there will be two rounds of simultaneous sessions in three tracks. And on Thursday, a wrap-up session and luncheon address to conclude the conference. It promises to be one of the most informative and exciting parts of this year's event, so don't miss it. Pre-registration by February 15 for Fiber Perspectives '91 is **$295**. On-site registration is **$395**.

Sharing Know-How on Asia-Pacific Telecommunications.

The Asia-Pacific Region is a hot spot for telecommunications. Mass development of new services is under way. Basic and advanced facilities are multiplying. And the increased interest in informational services is nothing less than phenomenal.

On Tuesday, learn first-hand what is taking place in the Asia-Pacific Region. Hosted by the Pacific Telecommunications Council, the day-long conference will begin with an overview by a panel of speakers from five countries.

Next, it's on to outlining existing and planned information services. Luncheon speaker Dr. Meheroo Jussawalla, Research Associate/Economist of the East-West Center in Honolulu, Hawaii, will address the current state of the region's economy and politics. The afternoon panel focuses on market potential, access and selling abroad.

Finally, it's the globalization of telecommunications. A speaker from an RBOC and others will tell us how joint ventures and strategic alliances are affecting and meeting the needs of our changing world.

What's New in Caribbean Telecommunications?

Find out Wednesday at a special, one-day conference sponsored by the Caribbean Telecommunications Council. The CTC conference will focus on such topics as Disaster Recovery Using Satellites and International Marketing, including Yellow Pages directories. A panel will discuss the financial and technical aspects of Cellular in Rural Applications for Latin America, as well as fixed cellular. And a demonstration will be given on Outside Plant Computer Graphics.

Registration Form for the Asia-Pacific and Caribbean Conferences

Name ☐ Mr. ☐ Ms. ☐ Dr. ____________
Title ____________
Company/Organization ____________
Address ____________ Room #/MS/Suite ____________
City ____________ State/Province ____________
Postal Code ____________ Country ____________
Telephone ____________ FAX ____________ TELEX ____________

Registration fee of $125 for each conference includes luncheon and seminar materials. Space will be limited, early registration is recommended. Please note: Duplicate this form for each conference. Fill out and **mail separately** to addresses for PTC and/or CTC.

☐ Payment Enclosed ☐ Purchase Order Enclosed
☐ VISA ☐ MasterCard ☐ American Express
Cardholder's Signature ____________
Account No. ____________ Exp. Date ____________

For PTC Conference, mail form and payment to:

Pacific Telecommunications Council
1110 University Ave., Suite 308
Honolulu, HI 96826 USA

Telephone: 1-808-941-3789
Facsimile: 1-808-944-4874

For CTC Conference, mail form and payment to:

Caribbean Telecommunications Council
c/o AT&T
954 Ponce de Leon Ave., 6th Floor
Santurce, PR 00907

Telephone: 1-809-729-2742
Facsimile: 1-809-725-6624

Note: No refunds after February 15, 1991.

SUPERCOMM '91 At-A-Glance

	Monday Exhibits Closed	Tuesday Exhibits Open 10-5	Wednesday Exhibits Open 9-5	Thursday Exhibits Open 9-3
8:30–		Continental Breakfast	Continental Breakfast	Continental Breakfast
9:00–	*TUTORIAL – ISDN **TE**	**Opening General Session** FCC Chairman Al Sikes Keynote Address	**Second General Session** Northern Telecom Presentation	**Third General Session** *Telephony/* *Network World*
9:30–	**Primer:** 1 **MG** Telecom "Buzzwords" **Seminars:** 2 **SI** Europe '92 3 **OP** Operational Support Systems 4 **TE** Advanced Intelligent Network			
10:00–				
10:15–		**Seminars:** 17 **TE** SONET – Basics 18 **TE** ISDN 19 **MG** National Services Coordination for Small Telcos 20 **MK** Marketing New Services 21 **TE** Gigabit Net Testbeds 22 **TE** Numbering Issues ASIA-PACIFIC TELECOMMUNICATIONS CONFERENCE (see registration form on page 3)	**Seminars:** 29 **TE** SONET – Applications 30 **SI** Customer Premises Equipment 31 **PO** Advanced Infrastructure Issues for Small Telcos 32 **MK** 800 - 900 Issues 33 **MG** Billing 34 **TE** Voice Processing CARIBBEAN TELECOMMUNICATIONS CONFERENCE (see registration form on page 3)	**Seminars:** 41 **OP** SS7 Update 42 **MK** Houston Users' Roundtable 43 **MG** Digital Cross Connects 44 **MK** New Product Development 45 **OP** Satellites 46 **MK** Facsimile
10:45–				
11:00–	**Primer:** 5 **TE** Fiber Optics **Seminars:** 6 **SI** Eastern Europe 7 **MG** Network Management Control 8 **TE** Open Network Architecture			
11:30–		**"Fiber Perspectives '91"** Lunch/Lecture (see Fiber Perspectives session choices on opposite page)	**"Fiber Perspectives '91"** Lunch/Lecture (see Fiber Perspectives session choices on opposite page)	**"Fiber Perspectives '91"** Lunch/Lecture and Wrap-up Panel (see Fiber Perspectives session choices on opposite page)
12:00–				
12:15–				
1:00–	*TUTORIAL – WIRELESS **TE**			
1:30–	Spotlight Panel: Telecom Research TIA Host	Spotlight Panel: Local Carriers/End Users USTA Host with ICA	Spotlight Panel: New Horizons for Telecom in Education Southwestern Bell Host	
2:30–				
2:45–	**Primer:** 9 **TE** ISDN **Seminars:** 10 **SI** Mexico/Brazil 11 **TE** Fiber 12 **PO** Infrastructure Development – Legislation	**Seminars:** 23 **MG** Wireless-I 24 **TE** LAN Interconnection 25 **PO** Infrastructure Development – Regulatory 26 **MK** Operator Services 27 **MG** Videoconferencing 28 **OP** EDI, EFT and Bar Coding	**Seminars:** 35 **MG** Wireless-II 36 **TE** Broadband 37 **TE** Network Design/Planning 38 **MK** Centrex 39 **OP** Videotex Gateway 40 **TE** SMDS – Update	
4:00–				
4:15–	**Primer:** 13 **TE** LANs/MANs **Seminars:** 14 **OP** End User Network Management 15 **MG** Network Reliability 16 **PO** Infrastructure Development – Judicial			
5:30–				

Planning Information

To assist in your seminar selections, we've divided SUPERCOMM '91 sessions into six categories:

- **TE** – Technical
- **OP** – Operational
- **MK** – Marketing
- **MG** – Management
- **PO** – Policy
- **SI** – Special Interest

Please respond to our survey on sessions you're likely to attend. Use the coupon on page 7, or simply mark up this schedule and mail a photocopy. Thank You!

*see registration form on opposite page

Note: Schedule subject to change

Fiber Perspectives '91 *Co-sponsored by USTA, TIA and* Telephony

Featuring Forum and Exhibits for Managing Transitions

When you attend "Fiber Perspectives '91," you'll get a glimpse of the future. This all-new addition to SUPERCOMM '91 is an instant attention-getter. The conference includes three tracks with a total of twelve sessions.

The first track, **Technology & Product Trends**, will focus on such topics as *The Digital Loop Carrier Revolution, Beyond Digital Cross Connects, Video Services* - Now, and *Passive and Active Optical Networks.*

The second track, **Marketing & Management**, features one double and three single sessions. For openers *Economic Opportunities and Constraints*, and *Craftspeople & the Network of the 90's.* Session two features *Managing the Transition from Copper to Fiber* – a must for telcos. Plus, *Fiber Competition: The New Carriers* and *Applications and Drivers – Fiber in the Loop.*

The third track focuses on **OSP Strategies for the Future**, beginning with the first session entitled *Power Strategies for the Local Loop.* Its discussions include *Issues Affecting Today's Powering Strategies, The Vendor Perspective*, and *The Carrier Perspective.* The second session is *Fiber Restoration with Texas A&M.* And the third session will be *The Economics of Fiber: New Growth Areas & Rehab.* Then a repeat of the *Texas A&M* presentation.

A Distinguished Group of Keynote Speakers.

Tuesday launches the beginning of Fiber Perspectives '91 with luncheon speech by Greg Hughes, President, AT&T's Network Cable Systems.

Wednesday, the luncheon address will be given by Royce Holland, President, Metropolitan Fiber Systems.

Thursday concludes with speech and wrap-up panel by Richard Snelling, Executive VP-Network, Southern Bell.

Pre-register Now and Save $100.

Sign up now for just $295. On-site registration is $395. Seating will be limited, so make your reservation today!

Tuesday

11:30-1:00
Lunch/Address
Greg Hughes, Pres.
AT&T's Network Cable Systems

1:00-2:30
First Sessions
Choose one: **A1** **B1** **C1**

2:45-4:15
Second Sessions
Choose one: **A2** **B2** **C2**

Wednesday

11:30-1:00
Lunch/Address
Royce Holland, Pres.
Metropolitan Fiber Systems

1:00-2:30
First Sessions
Choose one: **A3** **B3** **C3**

2:45-4:15
Second Sessions
Choose one: **A4** **B4** **C4**

Thursday

11:30-1:30
Lunch/Address and Wrap-up Session
Richard Snelling, Exec. Vice Pres. –
Network, Southern Bell

3:00 - Exhibits Close

Topics for Three Tracks

Technology and Product Trends

A1	The Digital Loop Carrier Revolution
A2	Beyond Digital Cross Connects
A3	Video Services – *Now*
A4	Passive and Active Optical Networks

Marketing and Management

B1	Economic Opportunities and Constraints/Craftspeople & the Network of the 90's
B2	Managing the Transition from Copper to Fiber
B3	Fiber Competition: The New Carriers
B4	Applications and Drivers – Fiber in the Loop

OSP Strategies for the Future

C1	Power Strategies for the Local Loop
C2	Fiber Restoration with Texas A&M
C3	The Economics of Fiber: New Growth Areas & Rehab
C4	Fiber Restoration with Texas A&M

Registration Form for Fiber Perspectives '91 and/or SUPERCOMM Tutorials

Registration fee for Tutorials
$75 each
☐ ISDN
Mon. – 9 am-12 noon $ ______
☐ Wireless Communications
Mon. – 1pm - 4 pm $ ______
Total $ ______

Registration fee for Fiber Perspectives '91
☐ **$295** Before Feb. 15 $ ______
☐ **$395** After Feb. 15 $ ______
Space is limited. Register early!
(Includes luncheons Tuesday, Wednesday and Thursday, seminars and all materials.)

☐ Payment Enclosed
(check made payable to TIA).
☐ Purchase Order Enclosed
☐ VISA
☐ MasterCard
☐ American Express
Cardholder's Signature ______
Account No. ______
Exp. Date ______
TOTAL amount enclosed $ ______
Note: No refunds after February 15, 1991.

Name ☐ Mr. ☐ Ms. ☐ Dr. ______
Title ______
Company/Organization ______
Address ______ Room #/MS/Suite ______
City ______ State/Province ______
Postal Code ______ Country ______
Telephone ______ FAX ______ TELEX ______

Mail to: Telecommunications Industry Assn.,150 N. Michigan Ave., Suite 600
Chicago, IL 60601 Telephone: (312) 782-8597 FAX: (312) 782-3617

Housing and Registration Information

Get the Industry Edge

Fill out this registration and housing form today for SUPERCOMM '91. All forms will be mailed to Rogal America (address on page 7). To handle housing questions on-site, Rogal will have a booth located in the Registration Area of the George R. Brown Convention Center.

Housing

A portion of each hotel's room block has been set aside for attendees. At the Hyatt Regency Houston, no more than 15 rooms will be allotted to any one company. At the Four Seasons Hotel, no more than 10 rooms will be allotted to any one company.

Hotel Deposits

A hotel deposit is required for each hotel room/suite requested. The deposit must be submitted with the Official Housing/Registration Form. Forms are date stamped and processed on a first-come, first-serve basis. All rooms must have a deposit in the amount of one night's lodging. The deposit may be in the form of a major credit card or a check payable to "Rogal America, Inc." (except where noted under Hotel Information).

Hotel Confirmations/Changes

Hotel reservation acknowledgements will be sent directly to you from Rogal. Any hotel changes, substitutions, or cancellations must be made directly through Rogal. Do not contact the hotels directly. Hotel cancellations can be made by mail, FAX 617/965-2729 or Telex 413053 ROGALAM, or call 617/965-8000 or 1-800-553-0505.

Badges

Badges will be mailed (USA only), so provide the correct mailing address for EACH registrant. You will receive your badge approximately 2 weeks prior to the show. If you do not receive your badge, please register on-site.

Foreign and Canadian badges will not be mailed. A special booth will be provided for pick-up of these badges in the Registration Area of the George R. Brown Convention Center.

Missed Deadline

Forms received after the SUPERCOMM '91 deadline of February 15, 1991 will be handled in two ways:

HOUSING: Rooms will be assigned on a space available basis.

SHOW REGISTRATION: Registrants whose forms are received after the deadline will be asked to register on-site.

Shuttle Bus

Shuttle Bus service will be provided between all SUPERCOMM '91 hotels and the George R. Brown Convention Center on March 18-21, 1991.

#	Hotel Information	# of Units	One Person	Two Person
1	* Allen Park Inn 2121 Allen Parkway	100	$ 62	$ 70
2	Days Inn Downtown 801 Calhoun	200	$ 75	$ 80
3	** Doubletree, Allen Center 400 Dallas St.	225	$104	$119
4	Doubletree, Post Oak 2001 Post Oak Blvd.	250	$105	$115
5	Four Seasons Hotel 1300 Lamar St.	250	$120 $135 $160	$140 $155 $185
6	Grand Hotel 2525 W. Loop South	200	$ 70	$ 80
7	Guest Quarters 5353 Westheimer Rd.	175	$109	$109
8	Holiday Inn, Astrodome 8111 Kirby Drive	150	$ 68	$ 78
9	Holiday Inn Crowne Plaza 2222 W. Loop South	350	$ 90	$ 98
10	Holiday Inn Galleria 3131 W. Loop South	250	$ 65	$ 65
11	Holiday Inn Greenway Plaza 2712 Southwest Fwy.	225	$ 76	$ 86
12	Hotel Luxeford Suites 1400 Old Spanish Trail	125	$ 67	$ 77
13	Houston Marriott, Astrodome 2100 S. Braeswood Dr.	250	$ 85	$ 95
14	The Houstonian Hotel 111 N. Post Oak Lane	100	$120	$130
15	Hyatt Regency Houston 1200 Louisiana St.	750	$120	$135
16	Inn on the Park Four Riverway	225	$150	$180
17	J.W. Marriott Houston Galleria 5150 Westheimer	350	$105	$115
18	The Lancaster Hotel 701 Texas Ave.	34	$145	$145
19	Marriott, West Loop 1750 W. Loop South	150	$118	$118
20	Quality Inn-Greenway Plaza 4020 Southwest Fwy.	150	$ 50	$ 60
21	Ramada Inn-Greenway Plaza 2929 Southwest Fwy.	150	$ 45	$ 45
22	Residence Inn 7710 S. Main Street	100	$ 75	$ 75
23	The Ritz-Carlton 1919 Briar Oaks Lane	125	$122	$137
24	Sheraton Astrodome Hotels 2350 S. Loop West	600	$ 68	$ 78
25	* Stouffer Presidente 6 Greenway Plaza East	250	$103	$115
26	Travelodge Viscount 2828 Southwest Fwy.	150	$52	$ 62
27	Westin Galleria Westin Oaks 5060 W. Alabama	400 300	$120 $120	$130 $130
28	Wyndham Warwick 5701 Main Street	175	$ 99	$109

* Accepts ONLY check or money order as 1st night deposit.

** Accepts ONLY American Express or check/money order as 1st night deposit.

Note: Due to the wide range of suite types, please call Rogal 1-800-553-0505 or 617-965-8000.

Advance Registration/Housing Request Form

1. Check ONE category that best describes your INDUSTRY AFFILIATION
(Also enter on line 3e).

Exchange Carriers/Subsidiaries
10 ☐ Bell Holding Companies
11 ☐ Bell Operating Companies
12 ☐ Independent Holding Companies
13 ☐ Independent Operating Companies
14 ☐ Foreign Telcos

Non-Operating Telco Subsidiaries
15 ☐ Bell
16 ☐ Independent

Other Carriers
17 ☐ Long Distance
18 ☐ International
19 ☐ Mobile/Cellular
20 ☐ CATV/Radio/TV

Other Telecom Providers
21 ☐ Telecom Manufacturers
22 ☐ Dealers & Distributors
23 ☐ Contractors & Electrical Services
24 ☐ Consultants & Architects
25 ☐ Financial & Leasing Companies
26 ☐ Data Communications Equipment Manufacturers
27 ☐ Data Communications Services
28 ☐ Telecommunications Associations

Telecom Users
29 ☐ Educational
30 ☐ Financial/Investment
31 ☐ Hospitals/Health Care
32 ☐ Hotel/Motel
33 ☐ Legal/Insurance/Real Estate
34 ☐ Publishing
37 ☐ Research & Development
38 ☐ Stadiums/Convention Centers
39 ☐ Trade (Retail/Wholesale)
40 ☐ Transportation/Pipelines
41 ☐ Utilities (Gas/Water/Electric)

Government
42 ☐ Government/Regulatory
43 ☐ Military
44 ☐ Foreign

Other
46 ☐ Press
50 ☐ Spouse/Child (non-industry)
51 ☐ Other (please specify)__________
____

REGISTRATION FORMS:
To register for the following events, refer to the page indicated. "Fiber Perspectives '91" - pg. 5; SUPERCOMM '91 Tutorials - pg. 5; Pacific Telecommunications Conference - pg. 3; Caribbean Telecommunications Conference - pg. 3.

2. Check ONE that best describes your professional responsibility
(also enter on line 3e).

A ☐ Corporate/Administrative
B ☐ Sales/Mkt./Customer Services
C ☐ Human Resources
D ☐ Engineering
E ☐ Network Operations
F ☐ Research & Development
G ☐ Central Office
H ☐ Transmission
I ☐ Cable & Wire
J ☐ Voice/Data Mgmt.
K ☐ Mobile/Cellular Comm.
L ☐ Support Services
M ☐ Fiber Optic Operations
N ☐ Other (please specify)__________

Please make copies if necessary.
Mail completed registration form(s) to:

Rogal America, Inc.
SUPERCOMM '91
313 Washington Street, Suite 300
Newton Corner, MA 02158

Conference Dates:
March 18-21, 1991

Exhibit Dates:
March 19-21, 1991

Pre-Registration Deadline:
February 15, 1991

3. Registration and/or Housing Reservation.
Whether or not you use hotel accommodations, please fill in to pre-register.
Please print.

a. Name ____
Last First (no initials) Nickname for badge

b. Title/Department ______________________________

c. Company ______________________________

d. Address ______________ Room #/MS/Suite ______________

City ______________ State __________Zip __________

Telephone (   ) ______________ FAX (   ) ______________

e. Industry Affiliation ________ Professional Responsibility ________
(Use number from #1) (Use letter from #2)

f. HOTEL PREFERENCE: 1st ______________________________

2nd ______________ 3rd ______________

If your hotel choices are not available, please check how your choice was made:

☐ Rate ☐ Location

All your rooms must have a guarantee in the amount of one night's lodgings. You may guarantee your room with a major credit card or a check payable to "Rogal America, Inc." (except where noted under Hotel Information).

g. Hotel Room Type Requested ______________________________

h. Arrival Date ______________ Departure Date ______________

i. Name of Second Occupant ______________________________
(Complete a registration form for this person.)

j. Payment by: ☐ check ☐ Visa ☐ MasterCard ☐ American Express

Credit Card # ______________ Card Exp. Date ______________

Signature ______________________________

Or, I have enclosed my check for $______ as deposit for first night's lodging.
If you are a member of the hotel frequent traveler club, please indicate your hotel chain and card number.

Hotel Chain ______________ Card Number ______________

k. Hotel Not Required ☐

Help Us Help You

We'd like to make your comfort our priority, by scheduling room sizes based on session popularity. Please fill in the number of each the SUPERCOMM '91 Primers/Seminars and/or check off any other events you plan to attend. Return to Henry Wieland, Executive Director - Special Events, USTA, 900 19th Street, N.W., Suite 800, Washington, D.C. USA, 20006-2190. Thank You!

Please write the number of each Primer/Seminar you plan to attend:

______ ______ ______ ______ ______
______ ______ ______ ______ ______

General Sessions:
☐ Tues. ☐ Wed. ☐ Thurs.

Spotlight Panels:
☐ Mon. ☐ Tues. ☐ Wed.

Tutorials:
☐ ISDN ☐ Wireless Comunications

☐ PTC Conference ☐ CTC Conference

Fiber Perspectives '91:
Lunch/Lecture: ☐ Tues. ☐ Wed. ☐ Thurs.

Sessions: (circle)	A1	A2	A3	A4
	B1	B2	B3	B4
	C1	C2	C3	C4

Houston: A World-Class Experience

Deep in the heart of every Texan, pride is on the up and up. Texans cater to visitors in a big way. But that's not unusual. They do everything in a big way. Houston's beautiful new George R. Brown Convention Center is a perfect example. So are the fine hotels throughout the city.

Culturally, Houston is one of only four U. S. cities to have its own company in each of the performing arts. The Museum of Fine Arts is one of the country's most outstanding art institutions. A permanent collection includes Van Gogh's *The Rocks* and Rogier van der Weyden's *Virgin and Child.*

The nightlife's downright exciting. Sophisticated dinner and comedy clubs abound. The music scene includes everything from cool jazz to country & western to rock 'n roll. There are bronco-busting Texas rodeos, historic tours, Six Flags Amusement Park, NASA's Manned Space Flight Center, and, for shopping, the famous Galleria Mall. And there's nothing better this side of heaven than the food you'll find in Houston's restaurants.

Texas. The West was won here. Now it's out to win your heart in Houston at SUPERCOMM '91.

Discount Airline and Car Rental Information

Delta Air Lines	American Airlines	Alamo® Rent A Car
Acct. No. U0537	Star #S0331KF	ID #64033
1-800-241-6760	1-800-433-1790	Plan Code "G3"
8am - 8pm EST	7am - Midnight CST	Call 1-800-732-3232
7 days a week	7 days a week	

Sweepstakes tickets for two to any American Airlines' European destination. Tickets will be awarded to an attendee during SUPERCOMM who used American Meeting Services desk. (Certain black-out periods apply.)

SUPERCOMM '91

For Programming:

USTA
UNITED STATES TELEPHONE ASSOCIATION
900 19th Street, N.W.
Suite 800
Washington, D.C. USA 20006-2190
Phone: (202) 835-3100
Fax: (202) 835-3248

To Exhibit:

TELECOMMUNICATIONS TIA INDUSTRY ASSOCIATION
150 N. Michigan Avenue
Suite 600
Chicago, IL USA 60601-7524
Phone: (312) 782-8597
Fax: (312) 782-3617
Telex: 595236 USTSACGO

SUPERCOMM '91 thanks *Telephony* and *Network World*, official publishers of these events. Watch for other brochures inserted in January issues.

Telephony

NETWORK WORLD

USTA
UNITED STATES TELEPHONE ASSOCIATION
900 19th Street, N.W.
Suite 800
Washington, D.C. USA 20006-2190

INTERNATIONAL NETWORKS

USER STRATEGIES, INTERNATIONAL SERVICES & REGULATION

Worth Noting

"One of the interesting conclusions we've found is that the economies of scale in local service are no greater than in long distance. This means competition is just as viable in local communications as in long distance."

Sir Bryan Carsberg
Director
U.K.'s Office of
Telecommunications
London

World News

MCI Communications Corp. recently announced commercial availability of its Vnet international virtual network offering in the U.K.

International Vnet lets subscribers to **British Telecommunications PLC**'s Featurenet service configure nodes in England as part of a Vnet private network. This enables users to extend U.S.-based Vnet dialing plans to U.K. locations, decrease their call setup times and receive lower rates on international calls.

According to Kevin Sheldon, director of international marketing for MCI, the charge for a five-minute international Vnet call to England is now approximately 9% less than the cost of a five-minute call routed to the U.K. as an off-net Vnet call.

US Sprint Communications Co. last week announced new European access points in Bern and Zurich, Switzerland, as well as Frankfurt, Germany, and Paris for its SprintNet public data network.

Earlier this year, US Sprint opened access centers in Amsterdam, London, Moscow, Tokyo and Nagoya, Japan.

The carrier now has 500 access centers to SprintNet worldwide and plans to have 1,000 access centers by 1995.

German two-way satellite mart opens to competition

Users should get better service, lower prices.

By Barton Crockett
Senior Editor

BONN, Germany — For the first time in history, private companies are selling two-way satellite services in Germany to compete with the dominant German carrier, Deutsche Bundespost Telekom.

The new competition is expected to benefit users by giving them increased service options and lower prices.

"We are moving forward, and I think we will have a very competitive market soon," said Peter Bross, head of the radio licensing division of Germany's Ministry of Posts and Telecommunications here.

Competition has sprung up in the past few months as the German government meted out its first three licenses for private companies to compete with Deutsche Bundespost in the two-way satellite market.

The licenses are the first fruits of a major regulatory change earlier this year that gave Germany one of the most liberal satellite regulatory environments in Europe.

Bross said 20 to 30 companies could be licensed to compete in Germany's two-way satellite services market by the spring of next year.

Services cut over

Each of the three licensed entrants — British Aerospace Communications, Ltd. in Sephenage, England; Infoware, GMBH in Cologne, Germany; and ANT Nachrichtentethnik, GMBH in Backnang, Germany — have either started offering services or plan to do so soon.

On Aug. 20, ANT became the first private company to receive a two-way satellite license from the German government.

It is now providing very small aperture terminal satellite services to about a half-dozen German users with a total of about 40 earth stations, according to Franz Russ, ANT's business manager for satellite network services.

Infoware received its license

(continued on page 32)

AT&T gets TAT-8 back up; user recounts 'headache'

By Barton Crockett
Senior Editor

LONDON — AT&T recently reported that the Trans-Atlantic Telecommunications-8 (TAT-8) submarine fiber-optic cable is now back in service after being knocked out for more than two weeks due to a faulty repeater.

From Oct. 30 until Nov. 16, TAT-8 was out of service because of an electrical fault in a signal repeater 2,000 miles off the coast of New Jersey, according to an AT&T spokesman here. After battling stormy seas for about two weeks, the crew of the AT&T-owned *Long Lines* ship managed to fix the faulty device, bringing the cable back on-line.

The cable outage was one of the longest service disruptions in TAT-8's 2-year life span.

A spokesman at AT&T International's Basking Ridge, N.J., headquarters said most TAT-8 traffic during the outage was rerouted over satellite facilities. As a result, he added, few users noticed the interruption.

But those users who did notice the outage said it was a headache.

William Coopman, manager of telecommunications at Deere & Co. in Moline, Ill., said that because of the outage, his company was forced to stop giving engineers in Germany on-line access to IBM computer-aided design and manufacturing software running on mainframes in Deere's headquarters.

In normal circumstances, Deere engineers in Mannheim, Germany, have on-line access to the CAD/CAM software via a 256K bit/sec link running over TAT-8, Coopman explained.

But during the outage, Deere had to shut down the on-line access feature because the CAD/CAM software was not able to support on-line access over links with satellite propagation delay, he said. As a result, the engineers had to queue up work during the day and send it over to the mainframe as part of a batch application at night.

Coopman complained that this slowed work and created problems for employees. The quality of voice service also deteriorated over the satellite link, he added.

Deere uses the TAT-8 link to multiplex voice traffic with data traffic.

International call termination charges

Call completion rates charged to U.S. carriers by foreign PTTs

Country	1988	1989	1990
Australia	$1.61	$1.58	$1.18
Austria	$1.75	$1.58	$1.45
Canada	$0.42	$0.42	$0.42
China	$3.96	$3.43	$3.43
Colombia	$1.85	$1.85	$1.85
Egypt	$2.00	$1.95	$1.90
France	$1.88	$1.58	$1.58
Hong Kong	$2.50	$2.35	$2.35
Italy	$2.20	$2.15	$1.97
Japan	$1.80	$1.76	$1.76
Sweden	$1.61	$1.05	$1.05
U.K.	$1.06	$1.06	$1.06
USSR	$9.00	$3.00	$3.00

All rates are on a per-minute basis for peak hours. Some countries have reduced rates for off-peak hours, which are not reflected.

SOURCE: FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON, D.C.
GRAPHIC BY SUSAN J. CHAMPENY

Carriers dispute FCC plan to set int'l rates

Opponents say proposal is unrealistic because FCC can't determine foreign carriers' costs.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — Domestic and foreign carriers are continuing to assail the FCC for its efforts to balance the lopsided rates charged by U.S. and foreign carriers for international calls.

In July, the Federal Communications Commission said it believes that foreign carriers are overcharging customers by as much as 50% for the portion of international calls they carry. FCC Chairman Alfred Sikes said he wants to find a way to force these carriers to bring their rates in line with costs.

The FCC is exploring ways to reward foreign carriers that voluntarily lower rates by offering such incentives as reduced paperwork for rate changes. The commission is also considering using its regulatory authority to mandate lower rates for foreign carriers that don't cooperate.

But numerous parties continue to raise questions about the FCC's authority to mandate rates between U.S. and foreign carriers. Even if the FCC has the authority, they question whether the agency can accurately determine foreign carriers' costs for providing service and set appropriate rates.

Many stated in filings earlier this month that the FCC's approach to the issue is unrealistic and unworkable.

But Sikes insisted that something must be done to correct the imbalance in rates charged by U.S. and foreign carriers for international calls in light of the fact that the U.S. has become a debtor nation for telecommunications services.

In 1988, the most recent year for which the FCC has figures, the U.S. had a $2 billion deficit for international services.

The reason for the deficit is twofold. U.S. carriers pay more for foreign carriers to terminate calls to other countries than foreign carriers pay for calls terminating in the U.S. In addition, the U.S. has a much higher volume of outgoing vs. incoming traffic.

Currently, individual carriers negotiate price structures — referred to as accounting rates — for international calls using guidelines set by the Consultative Committee on International Telephony and Telegraphy.

The FCC proposal would do away with that system. Instead, the commission would mandate the accounting rates that U.S. carriers set with foreign carriers.

Kokusai Denshin Denwa, Ltd. (KDD), Japan's largest international carrier, said it shares the FCC's desire for cost-based accounting rates. However, "it will be particularly difficult, if not impossible, for the commission or U.S. carriers to determine accurately the service costs of carriers in other nations," KDD stated in its filing with the FCC.

For example, the carrier said

(continued on page 32)

Saying
A Systems Int
Make Y

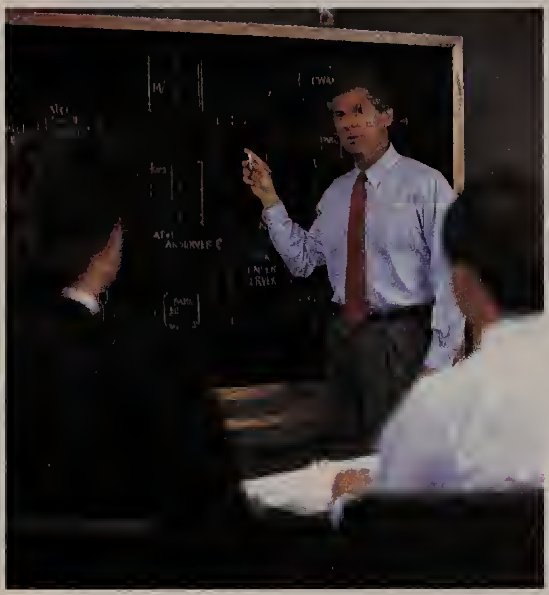
There's more to being a systems integrator than just saying so. International Data Corporation – the renowned industry research firm – has established criteria to benchmark those who claim to be systems integrators. They must:

- Create unique solutions for each contracting client.
- Carry out the project management activities of various specialists.
- Assume full systems' performance and financial responsibility for successful implementation.

While these are indeed strenuous standards, ERI exceeds them: We do more than hardware manufacturers because we can. We do more than VARs because we must. You see, ERI takes complete responsibility for project success. ERI delivers systems integration through comprehensive facilities and capabilities.

- Systems analysis, consulting and design
- Custom programming
- Systems testing, configuration, certification and installation
- Personnel training and education
- Systems assurance and guarantees
- Technical support on hardware and software
- Hardware maintenance
- Financing and leasing
- Flexible systems upgrades
- Extensive product inventory

You're
egrator Doesn't
u One.



It all begins when an ERI Account Management Team performs an exhaustive analysis of your existing systems, including the station-by-station business requirements. It doesn't end until that analysis has been transformed into a new, more productive operating environment.

Throughout the process you'll find ERI's commitment to satisfaction remains absolute. In fact, our Systems Assurance Guarantee means that you will never have to pay for a system that doesn't perform to expectations.

And you're never locked into today's technology because we offer a "Flexible Upgrade Policy" on every system. Plus, we offer complete financing for all ERI products and services.

As the nation's largest systems integrator for AT&T and Sun Microsystems, we ensure cross-platform interoperability in every project undertaken. Each is unique to the environment, completely managed for efficiency and timeliness, and backed by the toughest performance and financial guarantee in the industry. It takes the commitment of an entire company to consistently exceed IDC's criteria. It's the way we've chosen to answer your needs today while anticipating those you'll have tomorrow.

So call us at (800) 222-1050. You'll see the difference between the saying and doing.

ERI™
INTEGRATION

Answering your needs today.
Anticipating your needs for tomorrow.

AT&T Computer Systems Authorized Dealer

See The FAXNeT Form on Page 58

sun microsystems Value Added Reseller

All names, products and services mentioned are the trademarks or registered trademarks of their respective organizations

Carriers dispute FCC plan to set int'l rates

continued from page 29

that because it is prohibited from providing anything other than international service, it cannot split the cost of facilities between services as long-distance carriers in the U.S. can.

The Japanese carrier also pointed out that it faces much higher costs for energy, labor, transportation and office space than many other providers. It said costs for telecommunications facilities, which have been decreasing, constitute only 22% of its total costs. Therefore, little can be done to lower rates from savings on new technology implementation.

Televerket, the state-owned Swedish telecommunications provider, said it also would like to see accounting rates brought in line with costs.

However, the carrier said it believes that the FCC has no authority over non-U.S. carriers and little ability to mandate accounting rates.

Instead, Televerket recommends that the FCC work with the executive branch of the U.S. government to promote lower accounting rates through one-on-one negotiations and multinational forums.

While not questioning the authority of the FCC to set accounting rates for international services, AT&T has suggested that the FCC act more as a backstop than the driving force in equalizing rates. The carrier said the FCC should step in only after negotiations between carriers fail to produce lower rates.

AT&T said the commission should conduct an investigation into the rates. If the FCC finds rates that are not in the public interest, it should terminate all agreements between U.S. carriers and the offending foreign carrier.

US Sprint Communications Co. disagrees with the AT&T proposal, saying the wholesale dismissal of all carrier agreements could do more harm than good. Establishing agreements with foreign carriers often takes years and millions of dollars. If these agreements are eliminated, it may be very difficult or impossible to establish new deals later, the carrier said.

US Sprint said it favors the lowering of accounting rates but that alone may not resolve the U.S. deficit. The issue is complicated by factors such as the value of the dollar, service mix, call quality, and size and location of U.S. business subsidiaries in foreign countries.

For example, US Sprint said the U.S. has more incoming than outgoing international data traffic. Therefore, if accounting rates for Telex and packet-switched data are lowered, the U.S. would bring in less revenue from data traffic than it does now.

US Sprint urged the FCC to assist carriers but allow them to continue one-on-one negotiations with foreign providers.

MCI Communications Corp. offered a similar viewpoint and stressed that in order to avoid damaging competition, the FCC must ensure that lower accounting rates are applied to all carriers simultaneously. ▣

German two-way satellite mart opens

continued from page 29

on Sept. 27 and began providing services to its first customer, the German newspaper *Cologne Stadtanzeiger,* on Oct. 1, according to Goachim Turowsky, head of Infoware's satellite business department.

British Aerospace Communications received its license a few weeks ago and plans to commence services early next year, said Pauline Creasey, director of business development at the company.

International services scheduled

Each of the three companies said they will roll out international services, including service between Germany and the U.S., if sufficient demand develops.

British Aerospace Communications plans to focus strongly on the international market since it already has a license to provide one-way satellite services in the U.K. and expects to provide two-way services there once that is allowed by regulators.

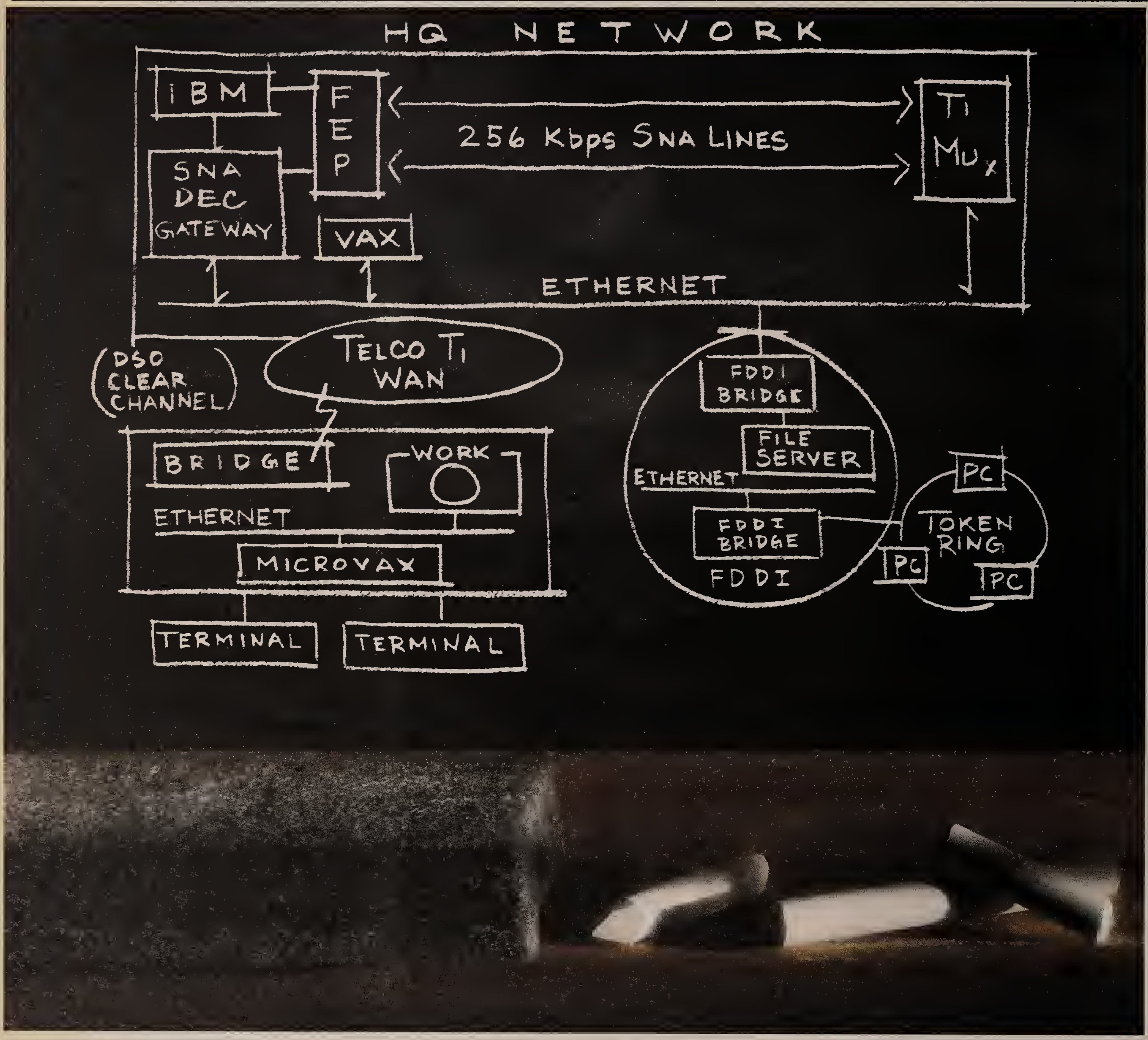
The U.K. government recently said it favors legalizing full competition in two-way satellite services as part of a major regulatory reform now under way. Currently, most other countries in Europe prohibit competition in two-way satellite services, although it is expected that these prohibitions will end eventually.

Each of the new licensees said they would also like to provide voice services over their satellite networks if German regulators let them.

Currently, German regulations restrict alternative satellite providers to supplying only data services, except when carrying traffic between eastern and western Germany. Satellite providers are allowed to supply voice services between west Germany and the former communist stronghold because terrestrial facilities linking the two areas are weak, Bross said.

Infoware said it plans to focus on the east German market. According to Turowsky, Infoware will specialize in supplying circuits at rates between 64K bit/sec and 2.048M bit/sec to users for communications between east Germany and other areas, as well as within east Germany.

Currently, Turowsky said, east Germany's public net infrastructure is too weak to readily support these services. For example, *Cologne Stadtanzeiger* is using a 64K bit/sec satellite link from Infoware to send versions of its newspaper from computers in Cologne, west Germany, to local printers in Halaf, east Germany, because east Germany's national carrier couldn't support the link. ▣



Communications is an art.

And it's an art that is getting more complex all the time, as gifted people attempt to make order out of all the diverse elements confronting us.

It's an art we've engaged in for more than a century, first in telecommunications and now in data communications and office systems. We integrate products from the leading component manufacturers in both areas. This gives you the best selection of the most advanced bridging, routing and integrated network management technology. . .as well as the assurance that you're getting equipment and service that you can rely on.

We take what you've got and add what you need to create the hybrid network that will best serve you. We integrate your infrastructure, PBX, mainframe, computing platforms, wiring distribution systems, LANS and WANS. GTE provides the consulting skills, design methodology, and design/integration capability with proven project management experience. Plus the services of a talented staff to furnish maintenance, service and training on site.

We provide the solutions which allow your people to do what they do best. . .run your business at maximum efficiency.

GTE

All trademarks referenced are the property of their respective owners.

FOR MORE INFORMATION CALL: 1-800-462-1075 NY STATE ONLY,
1-800-828-7280 OUTSIDE OF NY STATE.

THE POWER IS ON

See the FAXNeT Form on Page 58

PRODUCTS & SERVICES

THE LATEST OFFERINGS FROM VENDORS AND CARRIERS

First Look

MultiFaxPC supports V.32, Group III fax transmissions

Multi-Tech Systems, Inc. recently announced **MultiFaxPC,** a personal computer modem card that supports V.32 and CCITT Group III facsimile transmissions.

In V.32 modem mode, MultiFaxPC runs at 9.6K bit/sec and supports V.42 error correction protocols, V.42bis and Microcom, Inc.'s Microcom Network Protocol (MNP) 5 data compression at 4-to-1 and 2-to-1 compression ratios, respectively. The board supports remote configuration and dialback security as well.

Using MultiFaxPC's fax capabilities, users can conduct fax transmission in background mode while continuing to work on primary applications such as word processing or spreadsheets. On-board facsmile software supports a fax phone book of as many as 500 numbers.

MultiFaxPC is expected to ship in the first quarter of 1991 at a cost of $999.

Multi-Tech Systems, Inc., 2205 Woodale Drive, Mounds View, Minn. 55112; (612) 785-3500.

UTP Repeater links 3270s over unshielded wiring

Mux Lab recently unveiled its **UTP Repeater 3270,** a signal repeater that links IBM 3270 terminals over unshielded twisted-pair cabling to an IBM 3X74 cluster controller up to 3,000 feet away.

UTP Repeater 3270 links a single 3270 terminal to a cluster controller, or it can be linked to a multiplexer that allows several 3270s to share the same unit. However, the UTP Repeater 3270 can only support one host session while in operation.

The product uses proprietary circuitry that Mux Lab said reduces chances of signal degeneration. This enables users to link multiple units to further increase the distance between a 3270 terminal and its cluster controller.

UTP Repeater 3270 comes with RJ-11 and RJ-45 modular jacks. It costs $600 and is available now.

Mux Lab, 165 Graveline, St. Laurent, Quebec H4T 1E3; (514) 735-2741.

Aptec intros high-capacity file server

PORTLAND, Ore. — Aptec Computer Systems, Inc. recently announced a network file server capable of managing multiple high-capacity storage devices for use in supercomputer and other network environments.

The FutureLink file server, which can be configured with multiple terabytes of mass storage and up to 3.5G bytes of main memory, is based on a proprietary bus and supports industry-standard network interfaces such as Ethernet and the Fiber Distributed Data Interface.

The machine also supports industry-standard connections such as the High Performance Parallel Interface (HIPPI) and mainframe channel links that comply with the federal government's FIPS-60 standard, an IBM-compatible channel architecture.

Network file access is supported through use of the Transmission Control Protocol/Internet Protocol, Aptec's implementation of the Network File System or the industry-standard File Transfer Protocol.

File control is provided through use of General Atomics' UniTree software, which automatically moves user files between magnetic disks, optical disks, tape libraries and archival tapes. UniTree is a complete implementation of the IEEE's Mass Storage Reference Model, which defines how mass storage systems should handle data.

The heart of FutureLink is the existing Unix-based Aptec I/O Computer, a device with a parallel, high-performance bus used to support memory and processors.

Among other things, the I/O Computer was enhanced for use in FutureLink by adding a high-speed scaler processor to perform protocol processing and file and storage management tasks, and by the addition of network and direct-connect interfaces.

The aggregate bandwidth of the FutureLink box is 200M byte/sec, and it will be able to support sustained data transfer rates of up to 10M byte/sec, depending on the capabilities of the link used to tie the server to the computing resource. In 1992, the firm plans to support transfer rates of up to 40M byte/sec, according to Henry Taylor, manager of product marketing at Aptec.

System prices for FutureLink start at roughly $300,000. Prototype systems are expected to be delivered during the first half of 1991, and the first customer shipments are scheduled for the second half of that year.

Aptec is located at P.O. Box 6750, Portland, Ore. 97228, or call (503) 626-9000.

Momentum unveils XIPC tools for net applications

ENGLEWOOD, N.J. — Momentum Software Corp. recently announced a version of its Extended Inter Process Communications (XIPC) software tools for developing cooperative and client/server network applications.

XIPC is an interprocess communications mechanism that enables several operating tasks or processes across a net to synchronize and share information.

The software can be used to develop transaction processing applications, as well as handle brokerage trading, image processing and peer-to-peer or client/server applications.

The product runs on Unix, OS/2 and Digital Equipment Corp. VMS computers. It provides users with a software library of message queues, semaphores and shared-memory segments that enable application developers to synchronize processes or operations on computers in a net.

XIPC, however, does not use remote procedure call technology to trigger a task on another machine. Instead, XIPC uses message queues to transmit information between different operations or tasks on the network.

The software also supports shared-memory segments in which several operations or processes all share the same information, such as a directory and data table. Lastly, semaphores synchronize processes on the network so that when an event occurs, they respond by kicking off another process.

"This is just a different way of skinning the same cat," said Dan Schwartz, vice-president of software development at Momentum Software.

The XIPC library consumes between 30K and 60K bytes of data. The software is expected to ship in January. Pricing ranges from $4,000 to $8,000, depending on system configuration and the number of users supported.

Momentum Software can be reached at 401 S. Van Brunt St., Englewood, N.J. 07631; call (201) 871-0807.

Memorex Telex rolls out remote controller

Firm also enhances controller software, adds PCs with 3270 emulation, offers Token Ring Adapters.

By Charles Bruno
Assistant Managing Editor

TULSA, Okla. — Memorex Telex Corp. recently unleashed a number of announcements including a new low-end remote communications controller, two personal computers designed for IBM 3270 environments and token-ring adapter cards to link microcomputers to local-area networks.

The company unveiled its Memorex Telex STP 6541 Multifunction Communications Controller that supports as many as eight terminals.

Memorex Telex said the unit, which costs $4,125, will appeal to customers as a low-cost method of providing controller functions at small remote sites.

The unit supports one remote host connection at rates up to 64K bit/sec for IBM Systems Network Architecture or Synchronous Data Link Control protocols, and supports 9.6K bit/sec rates for Binary Synchronous Communications data transfer.

The 6541 Multifunction Communications Controller uses twisted-pair wiring to link terminals to the controller unit. That means customers can place terminals as far as 5,000 feet from the controller, Memorex Telex said.

The 6541 Multifunction Communications Controller also supports ASCII terminals that emulate IBM 3270 formats and enables ASCII terminals to relay data to each other through the controller.

The Memorex Telex STP 6541 Multifunction Communications Controller is available now.

In a separate announcement, the company released Generic 3.4 software for its 6541 and 6544 controllers.

The newest release of the software supports as many as 48 synchronous terminal sessions and a maximum of 256 logical unit connections, double the previous number supported. Generic 3.4 software is available now at no extra charge; it comes bundled with the 6541.

Memorex Telex also announced two new personal computers that feature quad-screen display capabilities for use in IBM 3270 terminal environments.

The microcomputers are an alternative to IBM 3270 terminals. Memorex Telex is positioning the computers as multipurpose devices that can perform terminal emulation at the same time a local application is being processed.

The Memorex Telex 7255-090 Intelligent Workstation is based on an Intel Corp. 16-MHz 80386SX microprocessor and supports IBM's Micro Channel Architecture (MCA).

For users that prefer a workstation based on the Industry Standard Architecture (ISA), the company rolled out its Memorex Telex 7025-090 Intelligent Workstation, which is based on an Intel 80286 microprocessor operating at either 12.5 MHz or 6 MHz.

The microcomputers come bundled with 3270 Distributed Function Terminal software that allows users to establish as many as four host terminal sessions simultaneously. The software also lets users cut and paste data between terminal sessions without having to rekey the data.

The Memorex Telex 7255-090 costs $8,295, while the Memorex Telex 7025-090 costs $7,495. Both models are available now.

Token-ring links

The company also announced two 16/4 Token Ring Adapters that link microcomputers based on the ISA bus and IBM's MCA bus to token-ring LANs.

Offering selectable speeds of 4M and 16M bit/sec, the adapters come with driver software that uses 90% of a token ring's available bandwidth, Memorex Telex said. Each 16/4 Token Ring Adapter comes with 128K bytes of memory, which is used to download Media Access Control protocols and IEEE 802.2 Link Level Control protocols to the adapters for packet buffering. This makes higher throughput on the ring possible, the company said.

Memorex Telex also offers optional software that supports remote program loading from servers supporting Novell, Inc.'s NetWare, IBM's PC LAN and LAN Server or Microsoft Corp.'s LAN Manager net operating systems.

Both adapters are expected to ship this month. A model for use in MCA-based personal computers costs $995, while an ISA-based version costs $895.

Memorex Telex can be reached by writing to 6422 E. 41st St., Tulsa, Okla. 74135, or by calling (918) 627-1111.

PBX SIGNALING

BY STEPHEN COATES

Australia's TeLinc faces status as worldwide standard

With a mix of suppliers using different private branch exchange signaling protocols, private telecommunications in Australia is, in some ways, a microcosm of the telecommunications environment of the Western world.

Despite its vast geographic landscape, Australia has a population of only 16 million, the majority of which is concentrated in a few major cities along the coast. This population concentration and long intercity distances have made private networking financially attractive within Australia.

NEC Corp., which dominates the PBX market in Australia with a 30% share, uses a proprietary private signaling protocol based on Common Channel Interoffice Signaling. However, other suppliers take a different approach. Plessey Co. PLC and Philips Industries, N.V. support a digital private network signaling system (DPNSS) developed by British Telecommunications PLC. Northern Telecom, Inc., however, has yet to announce DPNSS support in Australia.

> Because Ericsson supports DPNSS, its support of TeLinc is a strong endorsement.
>
> ▲▲▲

In 1987, Telecom Australia, the country's public network provider, released the internally developed digital PBX signaling protocol, TeLinc. If adopted by all suppliers, TeLinc would eliminate problems encountered when different suppliers' PBX systems are linked with digital trunks. The loudest opposition to this protocol among Australian PBX suppliers came from Plessey and Philips. With its proprietary protocol and large customer base, NEC was content to sit on the sidelines.

But Telecom Australia was undaunted; just when the future for TeLinc appeared bleak, a few events took place. Honeywell, Inc., which sells AT&T PBXs in Australia, and Northern Telecom announced TeLinc support for the System 75 and SL-1 PBXs, respectively.

Then the Australian government's Information Exchange Steering Committee, which administers the Government Open Systems Interconnection Profile standardization process, began talking about making TeLinc a mandatory requirement for future government PBX acquisitions.

But what has really swung the balance to TeLinc has been support by Australia's second largest PBX supplier, LM Ericsson. Because Ericsson also supports DPNSS in Australia, its support of TeLinc is a strong endorsement.

While the Australian suppliers of the SL-1, System 75, NEC 2400 and Fujitsu, Ltd. Omni S IV PBXs all claim their products support 1.544M bit/sec T-1 interfaces and internally perform the A-law to mu-law pulse code modulation conversion, all have yet to install such a link for any of their customers.

What is more interesting, however, is that of Fujitsu, Honeywell, NEC and Northern Telecom, three will support TeLinc in Australia. Northern Telecom and Fujitsu, in fact, plan to introduce it in America.

For the first time, a major North American PBX vendor, Northern Telecom, will support an open, published digital PBX network signaling protocol. Furthermore, by having developed its own interface for the same standard, the other major vendor, AT&T, will support the same standard.

With a little help from Northern Telecom and AT&T, Australian-developed TeLinc could become a major vendor-independent standard, not just in North America, but throughout the world.

Coates is an independent consultant located in Sydney, Australia.

NETWORK WORLD

Editor
John Gallant

Executive Editor
John Dix

Assistant Managing Editor — News
Charles Bruno

Senior Editors
Bob Brown — Industry Update
Jim Brown — Data Communications
Barton Crockett — International Networking
Paul Desmond — Data Communications
Wayne Eckerson — Management Strategies
Bob Wallace — Telecommunications

Senior Writer
Tom Smith — Local Networking

Staff Writer
Maureen Molloy

West Coast Bureau
2088 Union Street, Suite 2
San Francisco, Calif. 94123

Washington D.C. Bureau
Anita Taff — Bureau Chief
(202) 347-6184

Ellen Messmer — Correspondent
National Place
1331 Pennsylvania Ave. NW, Suite 505
Washington, D.C. 20004
(202) 347-4180

Features Editor
Paul Strauss

Managing Editor — Features
Bruce Guptill

Features Writer
Salvatore Salamone

Assistant Features Editors
Alison Conliffe
Susan Collins

Art Director
Dianne Barrett

Informational Graphics Designer
Susan Champeny

Junior Graphic Designer
Susan Slater

Assistant Managing Editor — Production
Beth Khoury

Associate Editor
Joanne Cummings

Copy Editors
Michelle Beaulieu
Karen Moltenbrey

Assistant to the Editor
Cheryl Tynan

Editorial Assistant
Tracie Seder

Contributing Editors
Daniel Briere
James Kobielus
Edwin Mier
Alan Pearce

President/Publisher
Gary J. Beach

Director of Financial Operations
Mary Fanning

Network World
161 Worcester Road
Framingham, Mass. 01701
(508) 875-6400
MCI Mail — 390-4868
FAX: 508-820-3467

An IDG Communications Publication

USER ADVISORY PANEL

Laurie Bride
Manager, Network Architecture
Boeing Computer Services

Roy Bruce
President
International Communications Association

Al Crawford
Senior Vice-President
American Express TRS Technologies, Int'l

Phillip Evans
Director, Telecommunications
FMC Corp.
Senior Vice-President
International Communications Association

Len Evenchik
Director of Communications
The Commonwealth of Massachusetts

Thomas Festa
President
Wall Street Telecommunications Association

Lionel Gillerman
Telecommunications Services
McDonnell Douglas Aerospace
Information Services Co.
Vice-President for Regulatory Affairs
Tele-Communications Association, Inc.

Jan Hackmann
Director of Telecommunications
Multicare Medical Center
President, Tele-Communications Association, Inc.

Michael Kaminski
Manager, CIM/Networking Technologies
General Motors Corp.

Ron Kopitowsky
Telecommunications Director
Metropolitan Transportation Authority, New York State
President, Communications Managers Association

Chuck Papageorgiou
Network Administrator
United Parcel Service

Henry Pfendt
Director, Information Technology Services
Eastman Kodak Co.

Kenneth Phillips
Vice-President, Office of Telecommunications Policy
Citicorp
Chairman, Committee of Corporate
Telecommunications Users

William Pomeroy
Director of Telecommunications Public Policy
International Communications Association

Michael Toto
Vice-President, Corporate Telecommunications
Johnson & Higgins
President
Association of Data Communications Users

Stanley Welland
Manager, Corporate Telecommunications
General Electric Co.

EDITORIAL

Net executives face tough times with recession ahead

Just how severe the impending recession will be is still debatable, but one thing that's clear is that corporate America is very concerned about the tough times ahead.

This spells trouble for networking departments because, unfortunately, far too many top executives still view networking as a cost center rather than a means to streamline operations and compete more effectively.

These executives are worried about the rapid pace at which network expenditures are rising — faster than profits at many companies. But frequently, they don't have a clear understanding of why that spending is growing; it's growing primarily because of their companies' increasing reliance on network technology.

Despite all the hype about gaining strategic advantage through technology, top managers will be focusing more on the bottom line.

So as business sours and economic storm clouds gather, senior management in many companies will be looking — you guessed it — at network departments as prime targets for cost cutting.

Outsourcing companies are sure to play on fears of an economic downturn in plying their services. And more and more, corporate executives will begin to heed the siren song of outsourcing as a way to get control of spending.

All of this will be a major problem for managers who have worked hard to build efficient, powerful network infrastructures and establish smart, innovative network staffs.

Right now, at the very onset of the downturn, network managers must redouble their efforts to change the perception that networking is an expensive utility or luxury. They need to show upper management that networking can be the solution rather than the problem during tough times.

Network managers will have to look long and hard at their operations to see whether there is fat to be trimmed — before someone else decides to do the cutting for them.

But more importantly, they must find ways to help the company cut costs and improve operating efficiency *through* networking. Net administrators have to show upper management how networking can help a company do more with less, get closer to customers and outperform competitors.

Network managers who meet the challenge of these tough times, promote the business value of networking and find innovative ways to do business through networking will prosper even as the business climate chills. Those who don't may wind up overseeing smaller kingdoms — or perhaps no kingdom at all.

NETWORK ADMINISTRATION

BY HOWARD CONRAD

LAN administrators need direction as well as training

Even when network administration seems under control, it often isn't. Many times, the source of the problem is the professionals who are expected to come up with the solutions.

The majority of network administrators never asked for their job. They were arbitrarily appointed to the spot and have watched in amazement as networks have become increasingly more complicated and critical to their companies' financial survival.

The typical local-area network administrator spends 50 hours a week just trying to keep the equipment up and running. Exploring new technologies and testing potentially useful applications are tasks usually placed on a back burner. Besides these burdens, most LAN administrators feel grossly undertrained and are understandably frustrated when their accomplishments go unnoticed.

Senior managers frequently misunderstand the sweeping scope of this unsung job and know little about the types of professionals best suited for the technically demanding and high-pressure pace of LAN administration.

The initial motivation for networking was a combination of cost and curiosity: "Let's try this LAN thing to see if it helps reduce our computer spending." Now personal computer-based networking is fully implemented as a corporate standard in hundreds of leading companies, and each month, it seems that another critical application is being ported to a LAN. However, a sudden failure can affect an entire enterprise — with devastating results.

Somehow, one essential element was forgotten along the way to this comprehensive connectivity: How do we prepare professional administrators to control the newly networked organization?

Haphazard hiring

Where do our system administrators come from? Too often, the answer is a matter of chance. "Mary in accounting knows something about computers, so let's make her our systems administrator." In other cases, well-intended efforts to upgrade the jobs of computer operators and word processors result in the new title of "system administrator" but without any new training. In theory, both approaches reward employees who've shown initiative by giving them new responsibilities.

But this strategy succeeds only if the people selected are provided with the necessary training and are motivated to learn.

> Today's LAN administrators need a detailed knowledge of a dizzying number of technologies, and each year, the ante is raised.
>
> ▲▲▲

Today's LAN administrators need a detailed knowledge of a dizzying number of technologies, and each year, the ante is raised as new software, hardware and operating systems further complicate the equation. The basic requirements include fluency in a LAN operating system, DOS and application programs.

Administrators also need to determine the source and location of hidden failures, gauge when a net is performing poorly, diagnose the cause and rapidly offer an effective solution.

Yet in most enterprises, LAN administrators have little voice in determining the nature of their networks. For example, they have no veto power over which types of applications may be installed on the network. As a result, users bring in applications developed outside, install them on the LAN and hope for the best. Too often, the administrator learns of this after the new software has brought the network to its knees.

Establishing several simple policies can correct many of the mistakes now plaguing network administration. The first is for management to recognize that successful network administration requires skills far beyond those of a technical assistant drafted from the information center.

As a second step, the job should be accurately defined — in terms of the tasks the net administrator must perform and any wish list functions. These tasks should be categorized according to their frequency, with three groupings of daily operations, special instances and general maintenance. At this point, many companies may discover that the job actually requires two people, not one.

The third step should include the evaluation of training needs. What must an administrator know to perform the tasks at hand? Are special skills required? Can they be acquired independently, or is outside training a necessary investment? Determine how many hours of training should be budgeted yearly to keep technical experts current.

As a fourth step, give the network administrator the authority and responsibility to manage those using the network. Among the factors this authority should embrace are jurisdiction over the applications installed on the LAN, the allowable external connections to other communications devices and the amount of training users should receive before being granted access to the entire network.

Finally, security should be considered. Each time another critical application moves from a mainframe to a LAN, someone, somewhere, is relishing the inevitable demise of the mainframe. And while this downsizing strategy is proving to be highly effective, we should not forget any network's greatest weakness — potential loss of data.

Mainframe-based management policies offer many excellent procedures, including change control, testing applications before introducing them to the company at large and ensuring the reliability of bulletproof backup procedures. These practices have been enhanced during the past several decades.

As we carve a new, expanded niche for the personal computer network, let's remember that these measures will also work for LANs. ▣

Conrad, a former network administrator, is a founder of Trellis Network Services, Inc., a network management and software publishing company with offices in Princeton, N.J., Hopkinton, Mass., and Falls Church, Va.

TELETOONS

BY FRANK AND TROISE

I dunno... I miss the old days when power struggles in the Networking Department weren't so touchy-feely...

I'd Love your job!
Care to get lost?
Phil Frank

LETTERS

Getting it right

In his letter "A stickler for style" (*NW,* Oct. 22), David Friedman discusses standards involving units of measurement. He's right about the international convention: It was the General Conference of Weights and Measures, an international treaty organization. But he's wrong about the standards.

The *names* of units based on a proper noun are not capitalized, but the first letters of their *symbols* are. The metric prefix for kilo is k; it is only mega (M) and higher that rate capital letters. Thus, we write volt and V, hertz and Hz, kilowatt and kW, and megahertz and MHz. As far as I know, all international and national standards follow these principles.

The full story can be found in ANSI/IEEE Std 260-1978 (reaffirmed 1985), "Standard Letter Symbols for Units of Measurement."

Bruce Barrow
IEEE Standards
Coordinating Committee 14
(Quantities, units and
letter symbols)
Gaithersburg, Md.

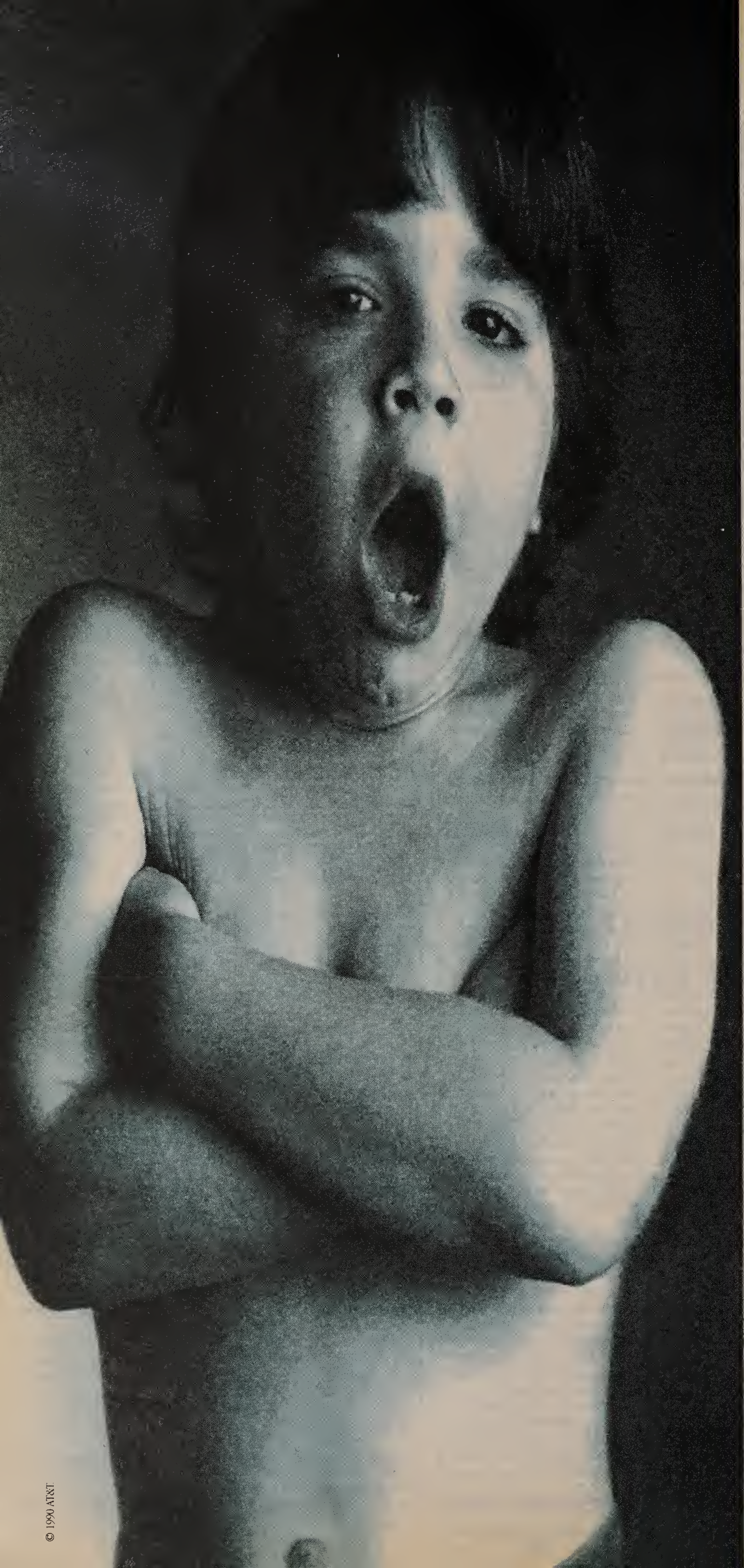
Network World *welcomes letters from its readers.*

Letters should be typed and double-spaced. Mail them to Editor, Network World, *161 Worcester Road, Framingham, Mass. 01701.*

Letters may be edited for space and clarity.

LIKE ALLIGATORS IN A SWAMP, unforeseen problems can really put the bite on your communications operation. Many managers find themselves wrestling with these networking reptiles every day.

If you've survived an "alligator attack," share it with our readers by calling Susan Collins, assistant features editor, at (508) 820-7413 or fax your idea to us at (508) 820-3467. The article should tell how the problem was solved and what steps can be taken to prevent it. Alligators should be 1,200 words in length and submitted either on disk or via modem.



© 1990 AT&T

I'm sitting in a

about my son

above our house

I told him tha

hand; however,

some unknown

and my little boy

MAINTENANCE

come up with

actually happen

switch is devoted

for the tip and he

fly right, Dad

for me going to

corner office on a round planet and I'm thinking
and how last night he looked at the crescent moon
and said, "Daddy, broken moon, broken moon." And
the moon would be fixed soon by a silent and unseen
the PBX that I bought for the corporation from
company might not be fixed any time soon at all,
who is only five said, "Dad, AT&T has a REMOTE
lab in Denver set up to detect any problems that might
their DEFINITY® *System and fix them before they*
You see, Dad, a full 1/3 of the memory of a DEFINITY
entirely to self-maintenance." And I told him thanks
looked up at me and said, "Straighten up and
because no silent and unseen hand is going to pay
college." AT&T provides several levels of remote maintenance and diagnostic services around the clock. Please call 1 800 247-1212, Ext. 106, for more information or a free copy of THE AT&T CATALOG. In Canada call 1 800 387-6100.

AT&T
The right choice.

Trends and
TECHNOLOGIES
RESHAPING
networks:

Distributed Computing

LANs bid for distributed power

Hot high-performance environments use parallel processing, RPCs and spare machine cycles to build virtual supercomputers.

CONTINUED FROM PAGE 1

will be invisible to the average computer user. Likewise, the same user could send a complex application across the network to run on dozens of processors simultaneously and obtain rapid results, just as if all the work had been executed locally.

Currently, several commercially sold distributed computing environments support these capabilities to varying degrees.

The environments, each with its own set of development tools and run-time components, include Scientific Computing Associates, Inc.'s Network Linda, BBN Systems and Technologies Corp.'s Cronus, the Apollo Division of Hewlett-Packard Co.'s Network Computing System (NCS), Sun Microsystems, Inc.'s Open Network Computing (ONC), the Open Software Foundation's (OSF) Distributed Computing Environment (DCE) and PeerLogic, Inc.'s PIPES Platform.

In addition, Xerox Corp.'s Palo Alto Research Center (PARC) is pushing back the frontiers of high-performance parallel network computing with an experimental architecture called Spawn.

Network Linda

Of these environments, Network Linda from Scientific Computing in New Haven, Conn., provides the most powerful high-performance network computing capabilities. This environment, still in beta test, transforms an ordinary LAN into a virtual supercomputer that uses the idle processing cycles of LAN-attached computers.

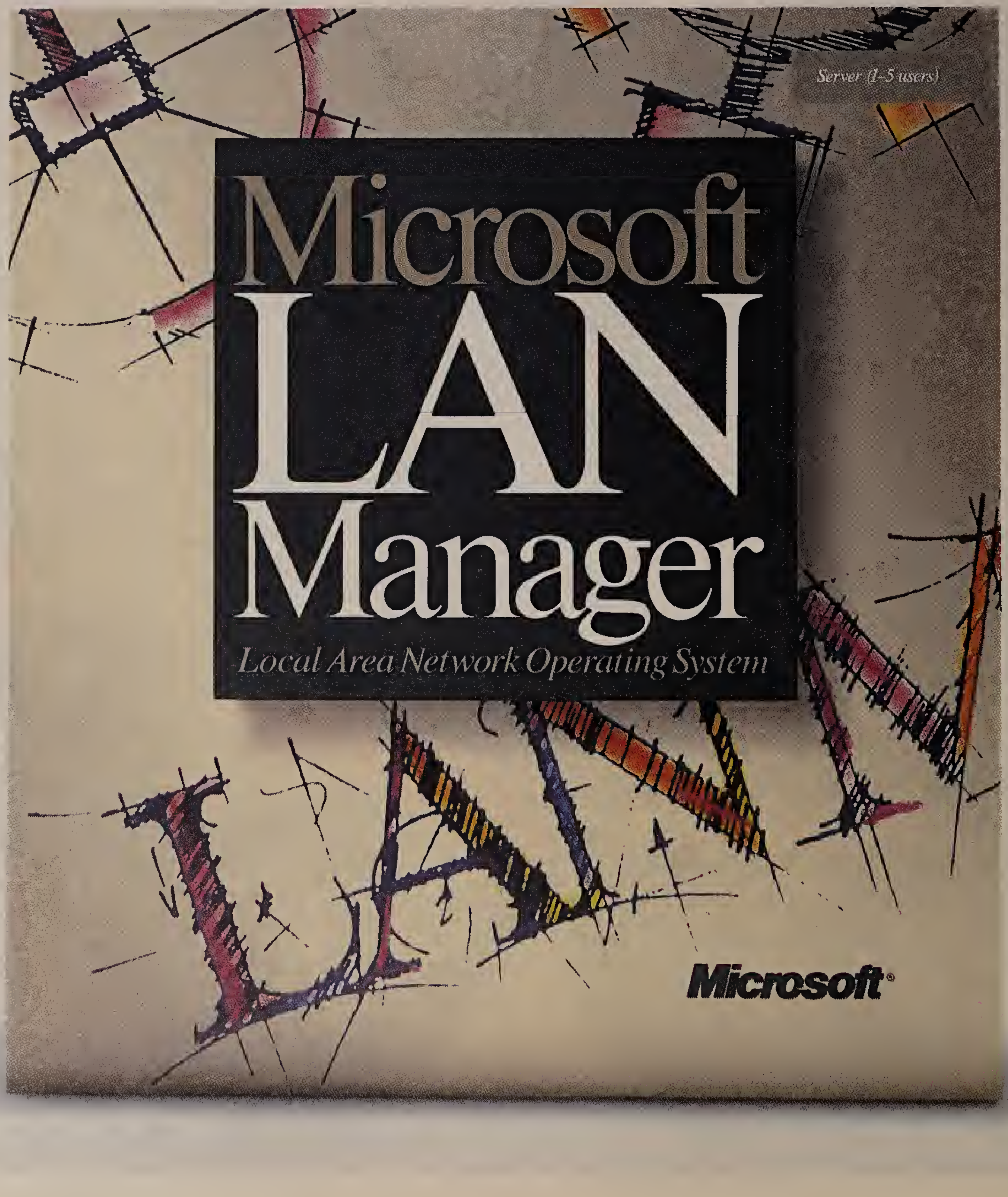
David Gelernter, Network Linda developer and Yale University computer science professor, coined the term "hypercomputer" to describe this data processing architecture.

(continued on page 42)

Kobielus, a contributing editor to Network World, *is a telecommunications analyst with Fairfax, Va.-based Network Management, Inc., one of the largest local-area and wide-area network systems integrators in the U.S.*

ILLUSTRATION ©1990 STEVE MOSCOWITZ

Think of it as an investment with immediate dividends.



And long-term gains.

The ideal network software should help you run all your departments.

Including those departments you haven't connected yet.

Introducing LAN Manager 2.0 from Microsoft. Its long list of standard features includes fault tolerance, 32-bit support and enough security to keep all your confidential data confidential.

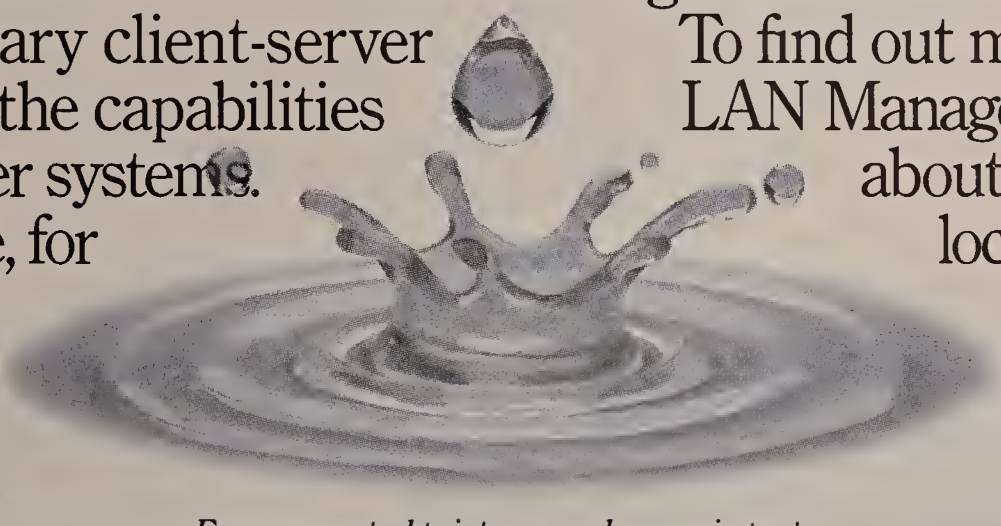
Plus, it's flexibly priced, based on the number of users. Which makes it a good value as well as a good product.

Innovative programs like Lotus Notes,® Saros™ FileShare,™ and Microsoft SQL Server take advantage of the Microsoft platform.

But down the line, choosing LAN Manager 2.0 will demonstrate even more than good value.

It will demonstrate vision. That's because its revolutionary client-server architecture gives you the capabilities you'd expect from larger systems.

Making it viable, for the first time, to run critical applications as well as non-critical ones on your own standard PC network.



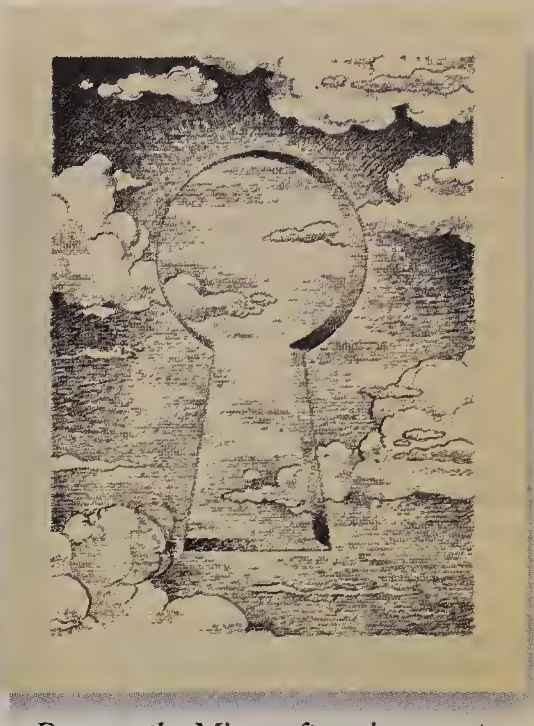
From one central point, you can have an impact across the whole network with features like domains.

And since client-server architecture can marry high-level control with all the speed and accessibility of a PC network, its future is indeed shining bright.

An observation not overlooked by the many systems companies who are selling and supporting it to the fullest.

Among them: 3Com, AT&T, DEC, HP, IBM, NCR and Ungermann-Bass.

But there's more to the story. Now your network administration will be more manageable, too, thanks to LAN Manager's multi-server administration tools. Plus, it's got the power to handle multiple processors.



Because the Microsoft environment is wide open, so is the future.

So no matter how big your network grows, it won't outgrow LAN Manager.

LAN Manager. Part of Microsoft's line of network products designed to let everyone make the right connections to the right information.

To find out more about Microsoft® LAN Manager 2.0, or to get details about a fact-filled seminar located near you, call us at (800) 227-6444, Department P04. And we'll introduce you to a program that will more than fulfill the promise of every blue-chip investment: The longer you have it, the better it looks.

Microsoft®
Making it all make sense™

Customers in Canada, call (416) 673-7638. Outside North America, call (206) 882-8661. © 1990 Microsoft Corporation. All rights reserved. Microsoft and the Microsoft logo are registered trademarks and Making it all make sense *is a trademark of Microsoft Corporation. Lotus Notes is a registered trademark of Lotus Development Corporation. Saros and FileShare are trademarks of Saros Corporation.*

(continued from page 38)

"Relatively few LANs use as much as 50% of available CPU during their busy shifts," he notes, while cautioning that "statistics in this area are mostly anecdotal. However, there is certainly a tremendous reservoir of unused CPU and communications capacity available on most LANs."

Building applications to run on the Network Linda hypercomputer involves learning parallel programming extensions to any of four popular programming languages: C, COBOL, FORTRAN and Ada.

Application source code incorporating these extensions is run through a Network Linda precompiler, which checks for syntax errors, generates and compiles standard language source code, optimizes the code for a distributed LAN/WAN environment and supports high-level run-time debugging and visualization.

These source language parallelizing extensions enable programmers to establish a shared memory, called a "tuple space," of tasks and data accessible to all Network Linda nodes. This shared memory is the pivot for coordinating parallel task execution "threads" within the Network Linda environment.

Nodes contribute, copy and remove tuple-space tasks and data using associative techniques similar to the manner in which operations are performed on records in a relational data base.

Network Linda applications execute in a run-time operating environment built on top of Apollo's NCS, a remote precedure call (RPC) that establishes logical connections between distributed processes and takes care of data conversion between diverse hardware and operating system environments (see Figure 1, page 46).

The hypercomputer can grow and shrink dynamically as users log on and off the network, thanks to two software programs: the "daemon" and the "location broker." The daemon, which runs on all nodes, designates one or more machines as the network scheduler, registers each node with the scheduler, declares which nodes are available to process tasks, distributes tasks to available nodes and monitors task execution.

Several tasks can execute concurrently on a single hypercomputer node. The location broker is a switchboard-style server process that enables hypercomputer nodes to locate one another without having to maintain local directory tables.

The only hardware platforms that Network Linda currently supports are Ethernet-connected Sun 3 and 4 engineering workstations running the SunOS operating system, Gelernter says.

Scientific Computing is exploring the possibility of porting Network Linda to DECstation 3000 and 5000 workstations and microcomputers incorporating Intel Corp. 80X86 processors, according to Leigh Cagan, Scientific Computing's vice-president.

Network Linda can produce stunning improvements in application speed over what is possible in a single-computer environment, Cagan says. The greater the number of parallel-processing LAN/WAN nodes brought online under Network Linda, the quicker an application executes. Scientific Computing has produced near-linear incremental speedups with Network Linda.

With linear speed, users can expand the processing capacity of their hypercomputers in increments simply by installing and configuring additional Network Linda computers on the LAN/WAN, Cagan says.

For example, an application running on 10 parallel nodes executes in almost one-tenth of the time as the same application running on a single computer. Increase the number of nodes to 100 and the run time drops to almost one-hundredth of the single-processor speed.

One of the chief design constraints in building a corporate hypercomputer is the requirement that it be transparent to users. They should not be able to detect any performance degradation on their workstations or personal computers when CPU cycles have been appropriated by someone else's job.

Network Linda performs this task, Cagan says, by running distributed jobs in background mode or at off-peak hours in accordance with an "availability poli-

© 1990 NYNEX Corporation.

All too often, the technology that's allowed you to acquire so much information also dictates how you can use it.

But unless you're free to manage, access and share information the way you want to, you're not getting the most from your information system.

That's where NYNEX® comes in.

Because we're involved in virtually every aspect of the Information Industry, we can give you an unbounded look at the whole picture.

From cellular to software, from hardware to high-speed data highways, from

cy'' programmed into each network node.

"Most people think of computing in terms of requiring a new piece of hardware to run applications," Gelernter says. "With Network Linda, however, no new hardware may be needed. An existing LAN can serve as the platform."

To date, Network Linda has been used for such applications as deoxyribonucleic acid sequence comparison, very-large-scale integrated circuit design and bond pricing.

Xerox's Spawn

At Xerox's PARC, researchers have developed a parallel network computing architecture called Spawn that bears some resemblance to Network Linda but incorporates a very different real-time mechanism for coordinating multiple CPU servers.

Spawn is a 2-year-old experimental system that explores concepts in "computational ecology," says Bernardo Huberman, project leader and head of PARC's Dynamics of Computation Group.

Computational ecology, Huberman explains, means that application processes behave like organisms that spawn and oversee offspring — for example, parallel tasks that have been farmed out to network compute servers.

These applications then choose survival strategies on the fly under uncertainty and time pressures, and with limited knowledge of what other processes are doing.

Spawn, like Network Linda, runs on a homogeneous Ethernet network of Sun workstations. Unlike Network Linda, Spawn is built on Sun's ONC RPC.

In regard to performance, it would appear that Spawn can hold its own with Network Linda. Huberman reports that Spawn has also achieved linear speedups in execution time for parallel network applications.

Applications must be parallelized to take advantage of Network Linda or Spawn. There are two approaches to this:

- Build new applications especially for this environment (the approach taken by Xerox).

The applications built thus far for Spawn are primarily statistical. Since Spawn is built on Sun's ONC, application source code must be run through an ONC precompiler to cleave it into client and server pieces according to instructions contained in an RPC specification file.

These precompiled client/server pieces must then be compiled for their target host environments and linked to stub RPC project code and the appropriate network protocols.

- Port an existing application to these environments, which could involve modifying and recompiling old code.

Greater than linear speedups occur in Spawn when additional specialized agent processes are used. This means that, rather than spinning off many clones of a single task to networked CPUs, Spawn spins off two or three different specialized processes. These specialized agent processes, which perform different tasks according to software instructions, trade information in midstream.

The appropriateness of either parallel design — multiple cloned offshoots of a single agent or multiple cloned offshoots of several specialized agents — depends on the nature of the application. The former is best suited to homogeneous parallel applications for which communications among subtasks is uniform and limited, and where brute computational force is needed, such as continually performing identical arithmetic operations.

The latter design is best suited for heterogeneous parallel applications that involve considerable and varied communications among subtasks and where many distinct tasks must be performed concurrently, such as querying and filtering thousands of data base files.

The survival strategies chosen by interacting Spawn processes make a big difference in the overall performance of the system, Huberman says. The wrong strategies, if executed by many processes simultaneously, can produce CPU- and network-loading imbalances that might bring the entire distributed system to a sudden halt.

For example, if all processes

(continued on page 46)

We give you freedom of information.

token rings to teleconferencing, from video to voice recognition, we offer the kind of freedom of choice in solutions that can really free up your information.

That's why scores of businesses, institutions and governments around the world have come to depend on NYNEX for their information needs. Call us at 1 800 535-1535. For solutions that will set you free.

Need to communicate? Need to compute? The answer is

NYNEX®

WORKING WITH A LARGE MANUFACTURER IS ALWAYS
MADE TO SOUND MORE APPEALING THAN IT IS.

Slow and complacent. That's the nature of the beast. You know you'd be better served by a more enterprising telecom company like InteCom.

Our integrated switching systems are designed to work with you, instead of the other way around.

What you may not know is that InteCom is now owned by one of the largest telecommunications companies in the world. And as part of a global strategy, we're to remain autonomous.

Which means that if it's stability you're looking for, you no longer have to pay such a heavy price for it.

Call 1-800-468-3800 (214-727-9141 in Texas) for the InteCom office or distributor near you. We're now $3.8 billion big. We just don't act it.

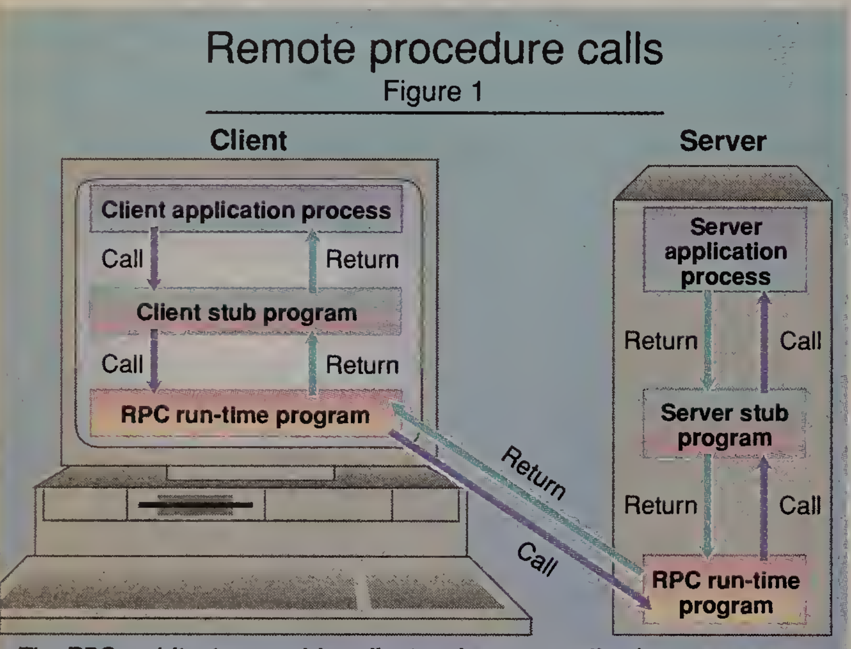
InteCom Inc.

A subsidiary of Matra Communication

See The FAXNeT Form on Page 58

(continued from page 43)

were instructed by Spawn to interact with only the fastest available network-attached computers, they would all jump onto the most powerful supercomputers and mainframes. This aggregate strategy would overload those machines and leave all other network processors idle.



The RPC architecture enables client and server application processes on different computers to interoperate over the network through stub programs, which manage logical connections and data conversions between the client and server, and RPC run-time programs, which manage the underlying network protocol.
RPC = Remote procedure call

GRAPHIC BY SUSAN SLATER SOURCE: NETWORK MANAGEMENT, INC., FAIRFAX, VA.

Similarly, if all processes jumped to the nearest available processor, this would result in them remaining on user personal computers and never venturing across the network toward other, faster machines.

To prevent such imbalances, Spawn incorporates a sophisticated resource allocation scheme that ensures a continuing balance between supply and demand for network processing power.

Spawn uses a flexible decentralized "bidding process" to preserve equilibrium between supply and demand for CPU time slots. Processes "buy" and "sell" CPU time with many options, evaluate trade-offs between the options and adapt quickly to changing conditions in the market for available time slots.

A Spawn application is designed to split itself into a group of computational tasks that can execute concurrently on various network compute servers. A root application manager process generates a set of subsidiary application managers and sends them across the net to take up residence on various machines as designated by the process.

Each local application manager spins off its own application worker process, which implements application processes such as performing numerical calculations or filtering data files. In addition, each application manager may spin off another level of application managers, which spawn their own workers to execute on various compute servers.

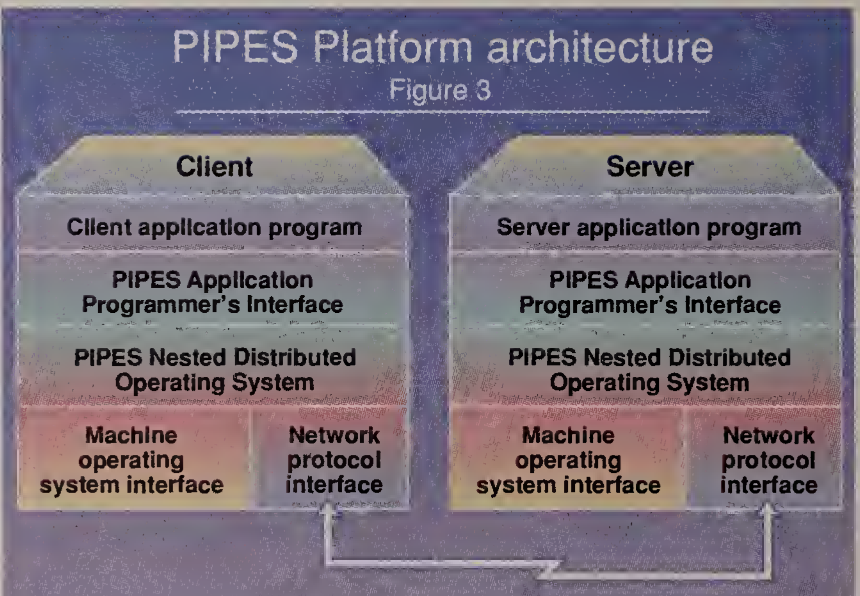
To execute these application worker processes, Spawn application managers must submit bids to various computers that are auctioning CPU time slots that will soon become available.

Spawn auction processes evaluate application manager bids for the next available block of time based on the offer price, length of time sought, and the minimum and maximum time slots that can be sold. High-bidding application managers win and submit their workers to the serving computers' resource manager software, which initiates and monitors execution of the task.

Tasks that overstay their allotted time are allowed to continue processing on the same nodes as long as they can pay the going market prices for extensions.

Results of Spawn computations are funneled back to the originating applications through hierarchies of application managers scattered throughout the network.

One outstanding research question under examination by Xerox is whether this elaborate coordination scheme, like the human hierarchies it imitates, sometimes imposes too much overhead on the tasks it manages.


PIPES Platform architecture
Figure 3
Client
Server
Client application program
PIPES Application Programmer's Interface
PIPES Nested Distributed Operating System
Machine operating system interface
Network protocol interface
Server application program
PIPES Application Programmer's Interface
PIPES Nested Distributed Operating System
Machine operating system interface
Network protocol interface

PeerLogic, Inc.'s PIPES Platform supports high-performance distributed computing capabilities in a non-remote procedure call-based environment.

GRAPHIC BY SUSAN SLATER SOURCE: NETWORK MANAGEMENT, INC., FAIRFAX, VA.

The research payoff from Spawn, Huberman says, comes from "understanding how to achieve superior global network behavior without centralized global controls." As networks grow larger and more complex, centralized control and monitoring becomes increasingly difficult, if not impossible. Under these conditions, a decentralized scheme such as Spawn's is the only viable approach, he says.

According to Huberman, Xerox may eventually incorporate Spawn principles into LAN-based document management systems that distribute processes such as storage, formatting, printing and display to specialized nodes. He indicates, however, that Xerox has no immediate plans to capitalize on findings from the research project.

BBN's Cronus

The Cronus distributed computing environment, developed and marketed by BBN Systems in Cambridge, Mass., is based on a different type of RPC than Scientific Computing's Network Linda or Xerox's Spawn.

Available commercially for three years, Cronus uses asynchronous RPCs to manage multiple parallel CPU servers. By contrast, Apollo's NCS and Sun's ONC — the interprocess coordination schemes underlying Scientific Computing's and Xerox's environments, respectively — use synchronous RPCs.

The difference, says Jim Berets, BBN's marketing manager, is that asynchronous RPCs allow a single client process to manage multiple CPU servers concurrently — a technique known as multicasting — while synchronous RPCs bind the client process to only one server process for the duration of a procedure call (see Figure 2, this page).

Multicasting enables developers to take better advantage of parallelism within a network computing environment, Berets says.

Synchronous RPCs limit parallel application performance by tying up client CPU and memory capacity while waiting for a response from the server. When the server delays completion of its task, the client process is effectively idled.

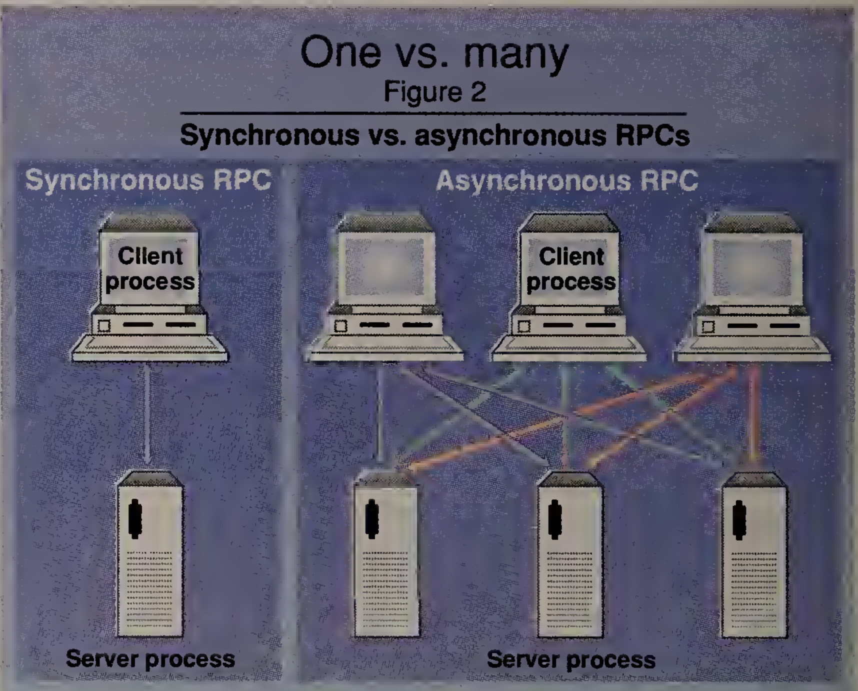
The roles of NCS and ONC

The ultimate acceptance of high-performance parallel network computing depends on the extent to which Apollo and Sun — the vendors of NCS and ONC, the two dominant RPC environments — support parallel processing features such as those found in Cronus, Network Linda and Spawn.

According to Paul Asmus, product manager for HP's Team Computing Program, the NCS Location Broker network object directory provides software developers with all the information they need to create parallel process coordination mechanisms similar to those contained in Network Linda or Spawn.

As noted previously, the Network Linda coordination mechanism, the tuple space, is built on the NCS Location Broker. Spawn's coordination scheme, the market-based processor bidding system, is built on Sun's ONC.

The University of Iowa's Center for Simulation and Design uses the NCS Location Broker in a LAN-based parallel-processing vehicle simulation program. The system can assign 16 dynamic equations to run concurrently on various Apollo Domain compute servers, says Doug Eltoft, director of operations in the center's computer department.



Synchronous RPCs bind the client process to only one server process for the duration of a procedure call. Asynchronous RPCs allow for many concurrent interactions among client and server processes.
RPC = Remote procedure calls

GRAPHIC BY SUSAN SLATER SOURCE: NETWORK MANAGEMENT, INC., FAIRFAX, VA.

Task Broker, a related Apollo environment, incorporates a bidding mechanism that finds the LAN processor best suited to handle large, compute-intensive batch jobs. Task Broker sends an entire job to a single processor, unlike Network Linda and Spawn, both of which break up jobs into smaller pieces that execute concurrently on several computers.

Texas Instruments, Inc. uses Task Broker to run circuit simulations that previously executed on company supercomputers and mainframes, says Ralph Phelps, a technical staff member in TI's High-Performance Application-Specific Integrated Circuit Division in Dallas.

TI users submit jobs to Task Broker, which searches for an available time slot on any of 50 Ethernet-attached Apollo Domain engineering workstations. Task Broker assigns the job to the appropriate computer, which, according to user-specified availability policies, either runs the job overnight or in background mode.

TI users are generally unaware when Task Broker has appropriated workstation processing cycles, Phelps says. "Users can type, edit and run local applications not knowing the Task Broker is running in the background," he says.

One constraint that Task Broker places on workstation users, Phelps adds, is the need to keep 30% to 40% of local disk space free for external jobs.

Task Broker users need to send only the data file to be processed remotely because the appropriate application programs already reside on host workstations, Asmus says. A configuration file on each node declares which applications it runs, as well as performance characteristics and time-slot availability. These configuration files enable workstations to evaluate bids for batch jobs.

Currently, Sun's ONC does not support a parallel LAN computation, says Geoffrey Baehr, director of networking and data communications at the company.

However, Sun is upgrading ONC to incorporate many high-performance parallel computing features available in other environments. It is introducing asynchronous RPCs to provide multicasting capabilities, as well as enhancing ONC's network naming/locator and multiple thread execution capabilities.

Sun has pledged to upgrade ONC to be functionally equivalent to the DCE from Boston-based OSF. Apollo, whose RPC is a central piece of DCE, has stated that it will migrate its environment toward compatibility with DCE beginning in the first half of 1991.

The OSF's DCE supports many key components of high-performance network computing, including RPCs, naming/locator service and multithreading. Multithreading is a critical component of distributed computing because it allows for multiple streams of control to run concurrently within an application.

"Multithreading makes it possible to parallelize an application for multiprocessor or network processing," says Jonathan Gossells, OSF business area manager for interoperability. "This enables you to have one client working concurrently with many servers or one server interacting concurrently with many clients."

PeerLogic's PIPES Platform supports multicasting, multithreading, naming/locator and other high-performance distributed computing capabilities in a non-RPC-based environment. The San Francisco-based company, formerly known as The Lambda Group, provides developers with a distributed operating system called PIPES Nested Distributed Operating System and a set of C language function calls known as PIPES Application Programmer's Interface for building parallel LAN applications (see Figure 3, page 46).

PeerLogic claims that its system requires one or two orders of magnitude less communications code than RPCs and other distributed application environments.

PIPES Platform is compatible with a variety of communications protocols, machine operating systems and hardware platforms. Locator information is replicated on each network node, which provides for a symmetrical multicasting environment, enables superior network load balancing and reduces the risk of a single point of failure on distributed applications.

Lightweights

All aforementioned distributed computing environments — Network Linda, Spawn, Cronus, NCS, ONC, DCE and PIPES Platform — depend on the availability of "lightweight" protocols to maximize performance of parallel network applications.

Lightweight protocols minimize the burden on network processing, memory and transmission capacity. In addition, they scale up easily to faster networks, such as Fiber Distributed Data Interface and Synchronous Optical Networks, meaning they can be ported to faster networks and obtain equal, if not superior, efficiency.

Lightweight implementations of Transmission Control Protocol/Internet Protocol have achieved close to 90% efficiency, according to Dan Lynch, president of Interop, Inc., a Mountain View, Calif., educational services firm. This means, for example, that TCP/IP on a 10M bit/sec Ethernet LAN can deliver up to 9M bit/sec application-to-application throughput.

"There's every reason to believe that TCP/IP will scale up to the gigabit networks that we'll be seeing in the mid-1990s," says Craig Partridge, research scientist at Bolt Beranek and Newman, Inc. in Cambridge. Transport Protocol 4, an Open Systems Interconnection transport-layer standard, should also scale up well, Partridge says, although it has a less efficient check-sum operation than TCP/IP.

Another lightweight protocol that may find its way into FDDI and other high-performance networks during the next few years is the Express Transfer Protocol (XTP), which is being developed by Protocol Engines, Inc. of Santa Barbara, Calif. XTP has support from Apollo, IBM, Intel, Silicon Graphics, Inc. and Xerox. XTP achieves high performance because it uses a fixed frame syntax, reduced data buffering, a reliable multicast technique and selective retransmission.

One protocol that would not be right for high-performance LAN applications is IBM's Systems Network Architecture, due to its terminal-to-host orientation, according to Bruce Nelson, director of technology at Auspex Systems of Santa Clara, Calif. High-performance protocols should be geared to a peer-to-peer computing environment, he says.

One might compare the emergence of high-performance parallel LAN supercomputing to the scientific efforts to develop efficient, low-cost solar power. Both technologies promise bountiful inexpensive sources of power that could transform the world economy in ways not yet imagined.

Gandalf Hybrid Networks Make Compatibility a Reality.

In today's sophisticated information processing and communications environment, you need a network that can integrate your existing computing resources into a single, cohesive, cost-effective, transparent system.

You need a network that can distribute all of your information to those who need and are authorized to use it, regardless of vendor or communications protocol. You need a Gandalf Hybrid Network.

With a Gandalf Hybrid Network, you can extend your existing investment in computers, increase the productivity of your people, and take advantage of tomorrow's technologies and standards.

Find out how Gandalf can make compatibility a reality in your networking environment. Call Gandalf, first in Hybrid Networks: ***1-800-GANDALF.***

Canada: 613-723-6500, UK: 0344 860272, Europe: 31 20 867611, France: 33 1 4760 0032, Australia: 61 2 437 5977

gandalf
Bridging
Islands
Of Excellence

© 1990 Gandalf Technologies Inc.

See us at ComNet, Ramada Booth C; and Networld, Booth 4301
See The FAXNeT Form on Page 58

In order to get ready for tomorrow, connect today.

Call Timeplex for unprecedented broadband internetworking capabilities to meet the demands of the 90s.

Solutions to bandwidth-intensive requirements such as distributed processing, CAD/CAM/CAE, imaging, and video conferencing are available now.

Internetwork your LANs and WANs and have your mission critical data flow through enterprise-wide networks with "virtual private LAN" security.

Timeplex's FDDI-based routers and concentrators consolidate your LAN traffic and move it across the wide area to any user. We have the broadest array of wide area networking options from FT-1, T-1/E-1, X.25 and T-3 assuring you of the right solutions to meet your needs today... and tomorrow.

Timeplex LAN/WAN systems are up and running in the largest FDDI network in the world installed for the Strategic Air Command. Communications-intensive Fortune 500 companies such as General Motors and Nabisco Brands are also choosing Timeplex.

Think of your network as a strategic asset. Let Timeplex show you how to even further expand your enterprise's productivity, efficiency, creativity and profitability with the capabilities that come with LAN/WAN internetworking.

Our 21 years of worldwide experience give our clients the highest levels of performance, service and support.

Certified by PTTs worldwide, Timeplex standards-based systems provide the optimal solution to your present and future needs by combining the best of public and private networking.

Connect with Timeplex at 1-800-669-2298 to get a jump on tomorrow. We'll send you our information kit on "Networking in the 90s".

It'll give you a jump on your competition today.

Timeplex®

The Connectivity Leader

TIMEPLEX CORPORATE HEADQUARTERS, 400 CHESTNUT RIDGE RD., WOODCLIFF LAKE, NJ 07675 1 (800) 669-2298

Canada	United Kingdom	Denmark	France	Europe	Australia	New Zealand	Far East	Middle East/Africa	Latin America
(416) 886-6100	(447) 534-3559	(453) 536-0088	(331) 3064-8100	(322) 762-1696	(612) 957-1660	(644) 711-287	(852) 833-6848	(322) 762-1696	(201) 930-4666

See The FAXNeT Form on Page 58

Why can't modems work together?

By STEVEN TURNER

The scenarios are familiar. Two high-speed modems link to transmit a long data file but instead of connecting at their top speed, they connect — after a long delay — at a much lower rate. The transmission seems to take forever.

Two other modems that are seemingly compatible fail to connect at all, and no transmission ever takes place. Another pair of modems connect, but they use dissimilar error correction and data compression schemes; they bypass these enhancements and resort to a slower, error-prone communications link.

These are but a few examples of the "dial-up dilemma" that has resulted from manufacturers implementing functionally similar but incompatible techniques in their modems.

The dial-up dilemma is not new but as more diverse products enter the marketplace, the problem seems to be worsening.

Before purchasing new products, users must make certain that what they are buying will work satisfactorily in their data environment. Product advertisements are often confusing; they sometimes give illusions of compatibility that don't materialize when the product is put into service.

(continued on page 52)

Turner is a technical staff manager at Universal Data Systems, Inc. in Huntsville, Ala.

Some struggle over compression, echo cancellation and error correction.

ILLUSTRATION ©1990 CHRIS DEMAREST

90 AT&T

Is your fractional T-1

Only AT&T ACCUNET® Spectrum of Digital Services offers you the exact capacity and bandwidth you need to more than 500 locations nationwide.

Choose AT&T as your fractional T-1 vendor and you won't be locked into a network that limits your options. Because with more than 500 locations nationwide, AT&T's ACCUNET Spectrum of Digital Services (ASDS) gives you the freedom to send voice, data and images to more locations than anyone else.

And that's not the only way you benefit from ASDS' extensive network. Along with more locations, we also have many more back-up routes available through our diversity options. Which means ASDS can also provide protection for your critical applications like no one else.

For most businesses ASDS' extensive network translates into lower access charges, too. That's because we're closer to more customers than our competitors.

You won't find an easier service to hook into, either.

network too confining?

Whether you have Analog Voice Grade Private Line, ACCUNET T1.5 or single channel digital access at 9.6 or 56 kbps, getting access to ASDS couldn't be simpler.

So if you're feeling cramped by your network's reach, give us a call. We've got just the thing to break you out.

Service.
Another AT&T advantage.

For more information on AT&T's ACCUNET Spectrum of Digital Services, call your AT&T Account Executive or 1 800 247-1212, Ext. 107.

AT&T
The right choice.

(continued from page 49)

When selecting modems and other communications equipment, the dictum should not be, "Let the buyer beware," but rather, "Let the buyer be educated."

Making the mess

How did this situation come about? Perhaps the major reason is that technology advances so rapidly that standardization can't keep up with it. By its very nature, standards activity proceeds slowly, relying on a consensus among those in the industry. On the other hand, successful product marketing often depends on getting new ideas to the marketplace quickly. As a result, these two concepts rarely follow the same timetable.

Once a new and different product hits the market, standardization of its unique techniques is very difficult because manufacturers are reluctant to base a standard on a technology established and led by one of their competitors. Standardization lends an air of credibility to any technique, and it's usually not considered good business to voluntarily give someone else's ideas that level of distinction.

Thus, new products that use unique methods spring up everywhere. If they become popular enough, some are adopted as de facto standards. Since such unofficial standards are not regulated, many products that claim to adhere to them eventually become incompatible. Sometimes manufacturers ignore these de facto standards and roll out their own solutions. The result is what is seen in today's modem marketplace — many products that logically should interoperate but don't.

Modem speeds, standards

The problem of modems that won't talk to other modems designed to run at the same rate is as old as modems themselves. Beginning with the early days of phone communications, standards have conflicted. While the Consultative Committee on International Telephony and Telegraphy was setting up the V.21 recommendation for 300 bit/sec data transmission in the late 1960s, the Bell 103J standard for 300 bit/sec data was developed in the U.S. Since only AT&T was making modems in this country at that time, the Bell System was free to develop its own standards.

While Bell 103J and V.21 are similar, there is no guarantee that modems adhering to either of the two standards will interoperate.

Similar problems exist at 1,200 and 4.8K bit/sec rates. Modems adhering to the CCITT V.22 recommendation won't always communicate with a Bell 212A modem at 1,200 bit/sec. Since most 1,200 bit/sec modems in the U.S. are built around the de facto 212A standard, this doesn't usually present problems domestically. It does matter, however, when the 1,200 bit/sec rate is used as a fallback rate in a higher speed modem on an international connection, and the two modems fail to communicate.

At 4.8K bit/sec, the Bell 208 standard is widely accepted in the U.S. but is virtually nonexistent elsewhere; the CCITT V.27 recommendation is favored in Europe. As a result, 4.8K bit/sec communications on international links originating in the U.S. is quite rare; the modems are not compatible at that rate. Instead, a 9.6K bit/sec modem will usually fall back to 2,400 bit/sec if the high-speed link fails; at that speed, it can usually find international compatibility via the CCITT V.22bis recommendation.

The problem of modems that won't talk to other modems is as old as modems themselves.

▲▲▲

Some of the most common modem speeds and standards are detailed in Figure 1 on page 56. It is evident that modem compatibility appears to improve at high speeds since only CCITT recommendations govern the higher speed designs. When the Bell divestiture occurred, the telephone company in the U.S. lost its monopoly on modems. At that point, many manufacturers got into the standards-making act, generally through participation in the CCITT. V.29 (leased-line) and V.32 (dial-up) modems are the rule at 9.6K bit/sec, and will normally communicate with V.29- and V.32-compliant modems, respectively.

Unfortunately, many incompatibilities remain, even for high-speed modems. These problems seem to revolve around nonstandard enhancements to the basic recommendations. If one modem uses Microcom, Inc.'s Microcom Network Protocol-type data compression and another modem uses CCITT V.42bis-type data compression, they can communicate only by resorting to noncompressed "native mode" operation.

Another problem resulted a few years ago from the difficulties in perfecting the complex echo canceler technology in 9.6K bit/sec, full-duplex CCITT V.32 modems.

To get a 9.6K bit/sec product on the market quickly to compete with the new V.32 modems, some manufacturers circumvented the echo cancelers and introduced half-duplex Ping-Pong modems. These modems used a V.32-type modulation scheme but could not work with true V.32 modems — only with other modems using the same proprietary techniques. Unfortunately, this was not always clear to

(continued on page 56)

ULTRA 96
V.32/V.42bis
X.32 (Dial X.25)

Since it was introduced four months ago, ULTRA 96 has become the fastest-selling Hayes modem ever.

Not only because the move to high-speed modems is in full swing, but because no other 9600 can deliver the features, performance, and networking capabilities of the fully loaded ULTRA 96.

ULTRA 96 provides up to 4-to-1 data compression, so it can save you money by letting you run computer equipment at its maximum speed.

In fact, you'll save so much on long-distance charges, your ULTRA 96 will pay for itself in just a few months. And its unique X.32 (Dial X.25) capability allows users to take advantage of the lower costs associated with the use of national and global packet-switched networks.

Of course, ULTRA™ works just as well on leased lines, satellite links, and other networks. It even automatically negotiates the best connection with other modems. Hayes or otherwise.

Plus, it uses the world standards for error-control and data compression, V.42 and V.42bis, and it can downshift to MNP® levels 2 through 5.

What's more, ULTRA 96 is compatible with the most popular high-speed modem on the market. The Hayes V-series® Smartmodem 9600.™

If you want to move up to the higher speeds and performance of ULTRA 96, you better order it now. Because it's going fast... even with our factory running 24 hours a day.

For more information about Hayes ULTRA 96, call 1-800-635-1225.

Hayes® *Our technology has the computer world talking. More than ever.*

At 38,400 bps, it's not only the fastest V.32 modem on the street, it's the fastest off the showroom floor.

MNP is a registered trademark of Microcom, Inc.
© 1990 Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, GA 30348

AT&T introduces a breakthrough in video conferencing.

Now that AT&T ACCUNET® Switched Digital Services has 384 kbps, you can dial up full-motion video conferences whenever you want.

Look what just burst onto the switched digital scene: Video conferencing at 384 kbps.

Now that AT&T offers 384 kbps through the public switched network (we're the only ones that do), you can dial up meetings with people outside your private network. And no matter where they are, you'll get such good picture quality, you'll be able to tell how the people on camera like their coffee.

That's not the end of our good news, either. AT&T's new Switched 384 also gives you the capability to transmit bulk data up to six times faster than our competition. And for image transfer and CAD/CAM, SW384 means rapid response time and crisp, clean images.

Just like our Switched Digital Service at 56 and 64 kbps, SW384 offers you a unique, money-saving advantage; it lets you transmit data as often or as infrequently as you need to, without adding new locations to your private network.

And no matter which speed you choose with SDS, you're transmitting over the only public switched network that's been designed, engineered and fully maintained exclusively for switched digital data transmissions.

So if your network doesn't always go as far and as fast as you'd like, give us a call. We can help you break into a whole new world of high-speed capabilities.

***Innovation.
Another AT&T advantage.***

For more information on AT&T's ACCUNET Switched 384 Service, call your AT&T Account Executive or 1 800 247-1212, Ext. 108.

AT&T
The right choice.

© 1990 AT&T

V.3

The Leader In
High-Speed Modems
Offers Another
Startling
Performance
Figure.

32

The best choice in high-speed, dial-up modems is now the best choice in V.32 modems.

Telebit has become the leading supplier of high-speed dial-up modems by delivering faster, more robust and reliable performance in mission-critical applications.

In fact, we created the market in 1985 with the TrailBlazer.®

Now we've put the same advanced technology and U.S.-built quality into a family of V.32 modems that sets a whole new standard of performance for CCITT-standard products.

Our T2500 was the first V.32 modem to deliver the full implementation of V.42 error-correction and V.42*bis* high-performance data compression capabilities. The T2500 supports all industry standards, as well as our patented multicarrier Packetized Ensemble Protocol® (PEP) technology.

Unlike competitive modems that hang up when line quality drops, PEP allows the T2500 to keep transmitting. Giving you real-world throughput that outclasses anything in its class.

You might think you'd pay a premium for this kind of performance, but actually our entire family of high-speed modems is very competitively priced, from $745 to $1495 (quantity one list price).

Call 1-800-TELEBIT today for more information on our V.32 modems. And the name of your nearest distributor.

Telebit. The highest quality, not the highest price.

TELEBIT®
When connectivity counts.

See the FAXNeT Form on Page 58

© 1990 Telebit Corp. (408) 734-4333 FAX: (408) 734-3333. Telebit, TrailBlazer and PEP are registered trademarks of Telebit Corp.

(continued from page 52)

the customer, and some mistook these half-duplex modems for true V.32 modems.

It's important to realize that the CCITT recommendations used to define modems are just that — recommendations. They are not universally enforced standards. While CCITT recommendations have the force of law in some countries, that is not the case in the U.S.

Common modem speeds and standards

Figure 1

Data rate (bit/sec)	Standard	Mode
300	Bell 103J CCITT V.21	2-wire, full-duplex 2-wire, full-duplex
1,200	Bell 212A Bell 202 CCITT V.22 CCITT V.23	2-wire, full-duplex 2-wire, half-duplex or 4-wire, full-duplex 2-wire, full-duplex 2-wire, full-duplex with 75 bit/sec back-channel
2,400	CCITT V.22bis CCITT V.26 CCITT V.26ter	2-wire, full-duplex 4-wire, full-duplex 2-wire, full-duplex with echo cancellation
4.8K	Bell 208 CCITT V.27 CCITT V.27ter	4-wire, full-duplex 4-wire, full-duplex 2-wire, full-duplex
9.6K	CCITT V.29 CCITT V.32	4-wire, full-duplex 2-wire, full-duplex with echo cancellation
14.4K	CCITT V.33	4-wire, full-duplex

GRAPHIC BY SUSAN SLATER

SOURCE: UNIVERSAL DATA SYSTEMS, INC., HUNTSVILLE, ALA.

Since these recommendations are open to interpretation, it is possible to find two modems that claim to be fully compliant with the same recommendation but don't work together properly.

The CCITT takes note of these problems and tries to tighten up the recommendations to remove uncertainties. But that still leaves the problem of existing modems that may not implement the recommendation correctly and, thus, may not work properly with truly compliant modems.

Since most high-speed modems strictly follow one of the CCITT recommendations, they typically will communicate. The problem at these speeds is often manufacturer-specific enhancements added to give a particular modem an extra edge in performance or versatility. For example, the Hayes Microcomputer Products, Inc. AT command set is widely used to control modem functions such as dialing and number storage.

Since the AT command set is only a de facto standard, manufacturers have extended it over the years to meet their own individual needs. As a result, the AT command set that works in one modem won't always work in another. This makes it difficult for manufacturers to agree on any common extension to the original command set. Users become confused because they see many different AT command sets in products they evaluate.

In addition, while the AT set is used extensively in the U.S., Europe relies heavily on the CCITT V.25bis dialing protocol, and the two are not compatible. To ease this problem, CCITT Study Group XVII in April began considering the idea of an international recommendation based on the AT command set.

Standard downshifting

Another modem protocol problem is the lack of a standardized fallback procedure. That is, when a high-speed modem link becomes too noisy and the modems need to fall back to a lower rate to communicate, there is no agreed-upon method for downshifting. If the two modems' fallback algorithms are different, they may reconnect at a lower speed than necessary (such as 1,200 bit/sec instead of 2,400 bit/sec), or they may abandon the link because they can't reestablish communications at any speed.

The CCITT is working on a standardized method to fall back from the soon-to-be-standardized 14.4K bit/sec rate of V.32bis modems to the 2,400 bit/sec rate of V.22bis modems. Although not yet approved, a technical solution has been worked out, and many manufacturers are starting to implement it in their products.

A similar U.S. standard, which would also include the de facto Bell 212A and 103J standards in the fallback protocol, is under consideration by the Telecommunications Industries Association (TIA) TR-30.1 Standards Committee on telephone data communications issues.

Of course, these new standards will leave a large installed base of modems that may not interoperate with modems meeting the new standards, much less other modems using another proprietary scheme. Even as some of the compatibility problems are discovered and corrected, the older equipment keeps the trouble alive for years.

Compatibility standards

Figure 2

Standard	Purpose	Status
CCITT V.32 fallback procedure	Provides a standardized way of negotiating fallback data rates from 9.6K bit/sec to 2,400 bit/sec	Agreed upon but not formally adopted
TIA fallback procedure	Provides a standardized way of negotiating fallback data rates from 9.6K bit/sec to 300 bit/sec, including the U.S. de facto 103J and 212A standards	Under consideration by the TIA TR-30.1 Committee
CCITT V.32bis	Provides standardized dial-up modem equipment at rates up to 14.4K bit/sec (extends V.32 to 14.4K bit/sec)	Under consideration by the CCITT Study Group XVII Committee (approval possible by mid-1991)
CCITT V.42	Provides standardized error control in modems via either MNP Level 4 or LAP M protocol	Approved April 1988
CCITT V.42bis	Provides standardized data compression in modems via a version of the Lempel-Ziv data compression algorithm	Approved September 1989
CCITT 19.2K bit/sec dial-up modem recommendation	Provides standardized dial-up modem communications at rates up to 19.2K bit/sec	Under consideration by the CCITT Study Group XVII Committee (future progress is unclear)

TIA = Telecommunications Industries Association
MNP = Microcom Network Protocol
LAP M = Link Access Procedure M

GRAPHIC BY SUSAN SLATER

SOURCE: UNIVERSAL DATA SYSTEMS, INC., HUNTSVILLE, ALA.

Modem software

One of the major problems in sending data via modems is incompatible communications and control software. Many packages are available both for sale and as shareware through bulletin board systems. Some, such as Xmodem, Ymodem, Kermit and Crosstalk, have gained enough popularity to become de facto standards. The most popular programs usually support several of these packages, so two users can generally find a common technique for transmitting data.

Because these products are incompatible, however, a dialogue must take place between the two users before the data is sent to ensure they're using the same protocol. This creates extra work for the users, and data transmission is prevented altogether when there is no common protocol.

Unfortunately, there is no easy way for the communications software to detect the characteristics of the transmission protocol on the opposite end of the link and adjust automatically to match the protocols. Some software is designed so that the receiving end can sense word length, parity and start/stop bit choices used by the transmitting end and adjust its parameters to match. This is helpful, but it doesn't solve the problem of incompatible protocols.

The future prospects of compatibility in this area are not promising. More communications packages appear every day, and with the new features they offer, compatibility moves further away from reality. This is not totally by accident, of course. Manufacturers of the software depend on the differences in their software to provide that extra edge users want, which translates into market share. The only answers users have are to rely on the old standby techniques common to many of the commercial packages or pay the price of incompatibility to get new features.

The array of dial-up modem network management software offerings that are starting to appear promise to cause headaches for network managers. They offer the capability to manage and monitor modem networks in a dial-up environment similar to that found in leased-line arrangements. Several vendors now offer such software, which is becoming very popular as a way to monitor traffic in the dial-up network, as well as isolate problem areas and hardware failures.

Not surprisingly, as vendors rush to get their products to market, their solutions become unique and proprietary. No effort is being made to standardize these procedures. It's unlikely that any attempt will be made to

(continued on page 58)

Error correction and data compression

One of the newest and most troublesome areas of dial-up modem incompatibility involves error correction and data compression. To provide more reliable communications and faster throughput, modem makers started including these features several years ago. Without a true standard in either area, a variety of techniques have sprung up — all of them proprietary.

The most common solution in this area has traditionally been the Microcom Network Protocol (MNP) from Microcom, Inc. MNP Class 4 offers a level of error control, while MNP Classes 5, 7 and above provide enhanced error control and data compression. Since these protocols are backward-compatible, users that stay with MNP should be able to use their error control and data compression features at a common level. Without a standard, however, other techniques have been invented for error control and data compression, thereby creating incompatibility.

To slow this trend, the Consultative Committee on International Telephony and Telegraphy has acted to create international recommendations for both error control and data compression. The V.42 recommendation, approved in April 1988, provides compatibility in error control through a new High-Level Data Link Control-like protocol called Link Access Procedure M. Additionally, MNP Class 4 error correction is supported in an appendix to V.42 to provide compatibility between new V.42-compliant modems and the installed base of modems using MNP. This appendix is implemented by manufacturers on an optional basis, however, and is not required for full compliance with V.42.

To follow up V.42, the CCITT approved the V.42bis recommendation for data compression in February. This recommendation is only now beginning to appear in products on the modem market. V.42bis is based on a version of the Lempel-Ziv data compression algorithm, similar to compression methods used in the Arc and Zip computer file compression techniques. It provides data compression ratios in excess of 3-to-1 on certain types of data and promises to be a major factor in high-speed modem sales in the future.

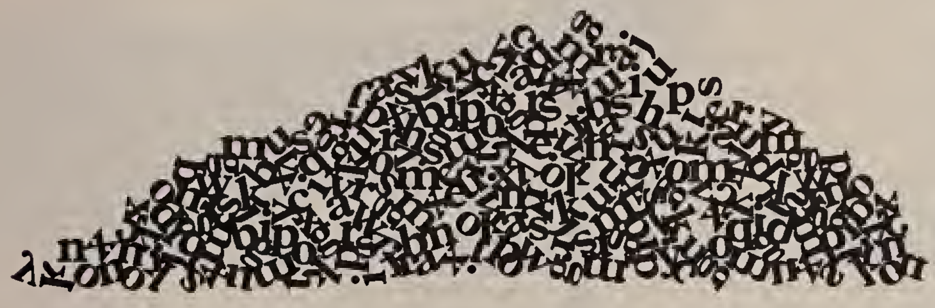
V.42bis does not provide inherent compatibility with any data compression technique already in use. To counter this, many modem manufacturers are including support of MNP Class 5 data compression in their V.42bis-compliant modems. This should provide adequate support of existing installed bases. However, users must be careful to select products that voluntarily support MNP Level 5 along with V.42bis or risk orphaning their existing MNP-style equipment.

By corralling the error correction and data compression problems before too many techniques proliferate, long-term compatibility problems can generally be avoided. Voluntary support of the most popular MNP techniques within CCITT-compliant products will help make that a reality.

— Steven Turner

Some businesses are so dependent on their communications system that when a disaster suddenly strikes they lose

everythin



unless they've discovered how to protect their business systems the Intelligent way.

With a customized disaster prevention and recovery program from Bell Atlantic. Where hot and cold sites are provided when needed. And where networks, computers and phone systems are quickly repaired or replaced when damage does occur. Preventing interruptions in service, negative customer response and incalculable losses.

All via Bell Atlantic and its Intelligent networQ.^{SM} Pretty smart, huh?

Intelligent networQ^{SM}

Bell Atlantic
We're More Than Just Talk.®

Call 1-800-522-6617 to get our Intelligence on the line.

© 1990 Bell Atlantic

(continued from page 56)

do so until the market is flooded with incompatible solutions. Only when a significant number of different solutions are available do users begin to encounter enough of them to recognize the problem. By that time, the horse is out of the barn and it's too late to close it.

Modem users want a hands-off solution. It would be ideal if users needed only to connect a modem to the telephone line and turn it on. But it's not that simple. Despite extensive standardization efforts in CCITT, TIA, ANSI and other standards bodies, the problem is expected to worsen in many areas as new products and technologies appear.

However, there are areas in which standardization has led technology. These include the higher speed modems such as V.32, where compatibility has generally been achieved throughout the industry. The current development of the V.32bis recommendation (14.4K bit/sec, full-duplex, echo-canceling modem) promises a great measure of compatibility at even higher rates.

The CCITT is also currently considering a 19.2K bit/sec dial-up modem recommendation. If it comes to pass, the recommendation will likely lead product introduction, signaling high compatibility from the beginning at 19.2K bit/sec.

In other areas, however, divergence instead of convergence will continue to be the name of the game. This is probably most true in the software arena, where uniqueness usually spells success and technological change is rapid. By the time the standard is complete, the technique or protocol is often obsolete.

A continuing problem will be existing hardware that meets no standard but works adequately and is not updated by the user to include newer versions or techniques. As long as users hold on to the old, incompatible equipment, it doesn't matter whether adequate standards are established for new equipment. Even when standards are created and used, the life cycle of existing products slows progress.

The key to compatibility is twofold. First, future compatibility must be achieved through increased standardization. It's the only way to achieve any level of interoperability in communications systems in a market-driven economy.

Figure 2 on page 56 is evidence of the recent increase in standards activity in high-speed modem communications technology. But as long as new and better products become available, many people will buy them and worry about compatibility problems later. It's up to the manufacturers, therefore, to maximize standardization in their product offerings.

Second, it is absolutely essential that users understand their communications environment. Each installation involves different modems, computers and software. Users must learn the strengths and limitations of this equipment. Many apparent compatibility problems could be solved if users knew their hardware's capabilities and features.

Users have long accepted that computer systems are different; now they must also accept that communications systems are different and learn how to interconnect the various pieces and use the correct programs to make those systems work.

Standardization will help, but the only answer to the dial-up dilemma is an educated user. Knowledge of the problems won't always provide the solution because often there isn't a solution. But it will go a long way toward reducing compatibility problems and will make the communications process much smoother. ◪

When the modem isn't to blame

Frequently, a garbled modem transmission is improperly blamed on the modem or its communications software. The culprit usually proves to be incompatible computer application software such as word processing packages, spreadsheets or data bases. Of course, the modem cannot control these problems; they must be corrected at the computer level first.

Software vendors are working to relieve the problem by putting conversion programs in their products. For example, most of the major word processing programs will now convert data from their own format to other popular formats at the touch of a key. Until this feature becomes routine, users must either be certain of the format desired on the receiving end or resort to ASCII data format to ensure compatibility.

Similar trends are being seen in other application software as well. Many users have expressed a desire for direct conversion between facsimile formats and their own preferred text format. Several Telecommunications Industries Association standards committees are planning to study this type of conversion.

American ingenuity being what it is, a new industry is springing up to take advantage of the problems brought on by software incompatibility. New standalone conversion programs are now available to convert everything from word processing formats to spreadsheet formats and graphical data formats. This expanding market may provide the best ongoing solution to incompatibilities of this type.

— *Steven Turner*

FAXNeT is a service designed to help readers of *Network World* gather important information via FAX on products and services advertised in *Network World*.

This week's FAXNeT ADVERTISERS

How to Use FAXNeT

Listed below in the FAXNeT Directory are the FAX numbers of participating advertisers in this week's issue of *Network World* and the page number where the ad appears. To use FAXNeT cut out the FAXNeT form and make a copy of the form for each inquiry you want to make. Then just FAX it to the vendor's number listed in the FAXNeT Directory.

Benefits to the *Network World* Reader

FAXNeT is designed to get you product and service information FAST. And, if your request is urgent and requires an immediate response from the vendor just check the "Urgent" Box.

NETWORK WORLD

FAXNeT

Attention: Marketing Communications Manager

Subject: This inquiry was generated by a *Network World* reader who is responding via FAX to your advertisement in *Network World*.

Name ______________________ Title ____________
Company/Div ______________________
Address ______________________
City ______________ State ________ Zip ________
Phone ______________ FAX ______________

☐ **URGENT**

Action Requested
☐ Request for Sales Call
☐ Request for Proposal
☐ Request for Information

Purchase Timeframe
☐ Within 60 Days
☐ Within Six Months
☐ Within One Year

Scope of Purchase Responsibility
☐ Enterprise Wide
☐ Departmental

Purchase Influence/Number of Sites
☐ One Site
☐ 2-9 Sites
☐ 10-20 Sites
☐ 21+ Sites

Product Advertised: ______________________
____

Intended Application: ______________________
____
____

Company	Page
AT&T Paradyne Fax: 813-530-2103	68-69
AT&T Tridom Fax: 404-426-0159	8
ERI Fax: 516-435-0995	30-31
Farallon Computing Fax: 415-841-5770	72
Fibermux Fax: 818-709-1556	23
Gandalf Data, Inc Fax: 708-541-6803	47
General Datacomm Fax: 203-758-8507	12
GTE Data/OS Systs Fax: 214-718-2426	32
Intecom Fax: 214-727-7142	44-45
ISICAD Fax: 714-533-8642	5
N.E.T. Fax: 415-780-5692	62
Racal Vadic Fax: 408-432-0188	65
SynOptics Fax: 415-967-8710	20
Systems Center Fax: 703-264-1312	7
T-bar Fax: 203-929-6408	6
Telebit Fax: 408-734-3333	54-55
Tel. Training Monthly Fax: 215-598-7690	62
Teletutor Fax: 603-433-2260	62
3COM Fax: 408-764-5001	26-27
Timeplex Fax: 201-391-0459	48
UniForum Fax: 708-299-1349	62
US Sprint Fax: 703-689-6998	3, 24
WorldCom Fax: 212-607-2274	28

ACCESS SERVER

Freedom of Choice...

A New Family of Terminal Servers from Gandalf!!

Gandalf's new Access Server family of terminal servers offers unparalleled flexibility by providing connectivity in multi-protocol environments.

LAT™ Terminal Server

- Local and remote terminal access to DEC Ethernet-based resources; LAT licensed software
- Simultaneous TCP/IP, X.25 or non-Ethernet host access available

TCP/IP Terminal Server

- Access TCP/IP hosts over an Ethernet network
- Utilize as an X.25/TCP/IP gateway

Wide Area Terminal Server

- Functions as a large statistical switching multiplexer or X.25 PAD
- Connects remote users via statistical multiplexing or X.25 to TCP/IP or LAT

For more information, call 1-800-GANDALF ext. 200

Circle Reader Service No. 1

gandalf

CABINETS

CABINETS

Price starts from $695.00.

Immediate delivery!

All sizes and colors!

New LAN Server Cabinet Available.

CODARAM corporation

AT&T Paradyne
Authorized Distributor

4040 Nine/McFarland Road, Suite 800 • Alpharetta, Georgia 30201
(404) 664-3510 • (404) 664-3610 (FAX) • (800) 726-0278

Circle Reader Service No. 3

CSU

Upgrading to ESF on your T-1 circuits?

We'll give you $500 for your old CSUs

If you upgrade your existing CSUs to Verilink Intelligent ESF CSUs by December 31, 1990, your existing CSUs, regardless of manufacturer, are worth up to $500 credit against your purchase. Call now for more information and take advantage of the network management benefits of ESF today. When you call, we'll send you "The Book on ESF" as a free gift.

1-800-669-4278

VERILINK®

Circle Reader Service No. 4

The Helfrich Company 19782 MacArthur Boulevard Suite 310, Irvine, California 92715

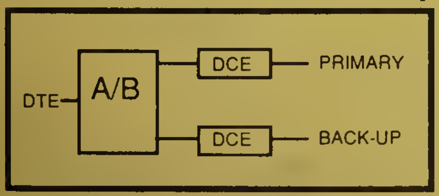
56K BACK-UP

Fully Automatic Back-up for Your Digital Circuits.

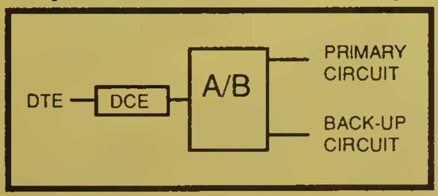
Back-up Any Of These:	With Any of These:
DDS; 2.4K to 56K	Switched 56
T1, Fractional T1	Dial-up Modem (V.32)
Any/All DS0 Channels	Redundant Circuits

Dataprobe offers complete back-up solutions for digital circuits. These Systems feature detection of failed circuit, auto-switching to back-up and restoration to the primary circuit when restored. Two types of back-up are available:

Alternate Route Back-up



Spare Circuit Back-up



Send for detailed catalog and applications bulletins.

dataprobe INC.

170 Coolidge Avenue Englewood, NJ 07631
Phone (201) 569-6464 Fax (201) 894-0939

Circle Reader Service No. 2

DATACOMM MATRIX SWITCH

BLOCKED BY OLDER MATRIX SWITCH TECHNOLOGY?

Discover the *NEW DIMENSIONS* in Network Management Technology
With the *MTRX* Family of *TANDEM* Electronic Matrix Switches

MTRX-500	512 Ports
MTRX-4000	4096 Ports
MTRX-8000	8192 Ports

BENEFITS	MTRX	OTHERS
*Largest Non-Blocked Port Capacity...8192 PORTS	YES	NO
*Up To 98% Data Cable Reduction DTE to DCE	YES	NO
*4000 FT DTE TO DCE With Twisted Pair Cable	YES	NO
*LAN Based PC Control - Ethernet Or Token-Ring	YES	NO
*Multi-tasking (VM-386) Universal Workstation	YES	NO
*Integral BERG/BERT and S.A.M. Test Functions	YES	NO
*Non-Proprietary Database, dBASE III PLUS/IV	YES	NO
*Supports Data Rates To 2.048MBPS	YES	SOME

Over 30,000 Ports Installed At RBOCs and Fortune 1000 Companies

Datacomm Management Sciences Inc.

"The Responsive Ones"

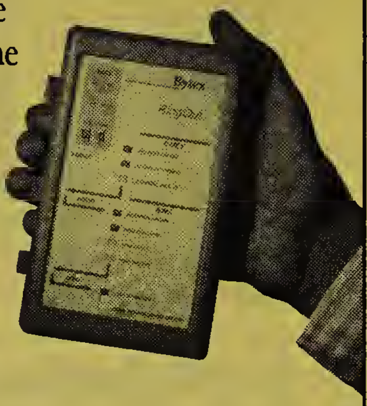
Circle Reader Service No. 5

25 Van Zant Street
East Norwalk, CT 06855
TEL: (203) 838-7183

dBASE III PLUS/IV are trademarks of Ashton-Tate Corporation

DIAGNOSTIC TEST EQUIPMENT

Get your hands on the most comprehensive Token Ring cable tester for only $1495.



Introducing the Bytex RingOut cable tester—the first designed specifically for Token Ring. And the easiest-to-use. ▪ Tests 4 and 16 Mbps STP and UTP LANs. ▪ Detects damaged or improperly installed cables or connectors. ▪ Confirms correct operation of MSAU. ▪ Detects and isolates beaconing nodes. ▪ Works on live LANs—no shutdown required. *Order by January 1, 1991 for a 30-day money back guarantee.*

Call 1-800-23-BYTEX for details now.

Bytex

Bytex is a registered trademark of Bytex Corp.

Circle Reader Service No. 6

FRACTIONAL T1

FRACTIONAL T1 CSU/DSU

- * Compatible with carrier-provided T1 services
- * Inputs in multiples of 56 or 64 Kbps
- * Full management & control capability
- * Two models: Basic and Advanced

From the growing Rad family.

RAD
data communications inc.

151 W. Passaic St.
Rochelle Park, N.J. 07662
TEL: (201) 587-8822
FAX: (201) 587-8847

See Us At Comdex
Sands Expo Center
Booth # N3193

Circle Reader Service No. 8

DIAL-UP MANAGEMENT

Season's Greetings from

Communication Devices, Inc. wishes you all the best in this Holiday Season, and in the new year. We appreciate your support and look forward to serving your dial-up network management needs in the future.

Circle Reader Service No. 16

Communication Devices, Inc.
1 Forstmann Ct. • Clifton, NJ 07011 • 800/359-8561 • Fax 201/772-0747

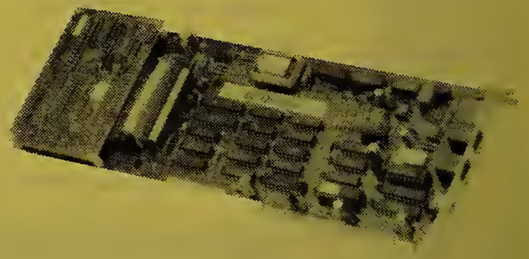
LAN/FAX GATEWAY SERVER

CAN LAN USERS FAX FROM WORKSTATIONS?

Yes, introducing Imavox's TurboFax-Net, our gateway server! Anyone on the network can send or receive faxes from their workstation. File transfer any text or graphics file at 9600 bps. Use your fax machine as a scanner. Postscript compatible. Supports various printers, scanners and fax machines. Short learning curve means increased productivity. Easy to use and install.

TURBOFAX-NET
LIST PRICE: $995
Credit Cards accepted

Also, for stand alone systems
TURBOFAX LIST PRICE: $395



Imavox

IMAVOX CORPORATION
3350 Scott Blvd., Building 38-02
Santa Clara, CA 95054
800-969-4628; FAX: 408-980-8718

Circle Reader Service No. 9

ETHERNET NETWORK MONITORING SYSTEM

The Network Professor®

- **Multi-Segment** Ethernet/IEEE 802.3 LAN Monitoring System.
- Global Network Monitoring and from **ANY** Location.
- Monitors **ALL** LAN traffic conditions on every segment, for all Stations/Nodes and Protocols, **simultaneously**.
- Alarming for user defined thresholds and detection of error conditions, resulting in **decreased downtime costs**.
- **X-Motif or ANSI** user interface provides access to current and historical network statistics via a Relational Database.
- Complies with **ISO Standards** for Enterprise Management.
- Industry proven since 1989. (**CALL NOW** for Fortune 500 references.)

"...only fully functional LAN Monitoring System..."
Bill Hancock

For Literature and your **FREE** Evaluation Package
CALL (213) 379-2505
Look for our NEW ***4 port Local Bridge!***

TECHNICALLY ELITE CONCEPTS®

Circle Reader Service No. 7

Send For Free Info

NW Dec 90

For more information on any of the products and services advertised in *NetworkWorld's ActionCenter*, circle the Reader Service Numbers on this coupon which correspond to the advertisement of interest to you.

Complete the coupon information and mail to:
NetworkWorld
P.O. Box 5090, Pittsfield, MA 01203

Expires 3/31/91

Name ______
Title ______
Company ______
Phone ( ) ______
Street ______
City ______
State ______ Zip ______

NW Dec 90

1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25
26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41
42 43 44 45 46 47 48 49
50 51 52 53 54 55 56 57

Send for free information

For more information on any of the products and services advertised in *Network World's* Action Center, circle the Reader Service Numbers on this card which correspond to the advertisements of interest to you.

Complete the coupon information and mail to: NETWORK WORLD
The Newsweekly of Enterprise Networking Strategies

(Dec. Expires March 31, 1991)

Name____________________
Title____________________
Company____________________
Street____________________
City____________________
State__________ Zip__________
Phone____________________

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	
18	19	20	21	22	23	24	25	
26	27	28	29	30	31	32	33	
34	35	36	37	38	39	40	41	
42	43	44	45	46	47	48	49	
50	51	52	53	54	55	56	57	

Send for free information

For more information on any of the products and services advertised in *Network World's* Action Center, circle the Reader Service Numbers on this card which correspond to the advertisements of interest to you.

Complete the coupon information and mail to: NETWORK WORLD
The Newsweekly of Enterprise Networking Strategies

(Dec. Expires March 31, 1991)

Name____________________
Title____________________
Company____________________
Street____________________
City____________________
State__________ Zip__________
Phone____________________

1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25
26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41
42 43 44 45 46 47 48 49
50 51 52 53 54 55 56 57

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 716 PITTSFIELD, MA

POSTAGE PAID BY ADDRESSEE

NETWORK WORLD

The Newsweekly of Enterprise Networking Strategies

P.O. Box 5090
Pittsfield, MA 01203-9838

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 716 PITTSFIELD, MA

POSTAGE PAID BY ADDRESSEE

NETWORK WORLD

The Newsweekly of Enterprise Networking Strategies

P.O. Box 5090
Pittsfield, MA 01203-9838

MEMORY UPGRADE

MEMORY UPGRADES

IBM PS/1 & PS/2 Memory

512Kb, 2Mb Upgrades	CALL
PS/1 's	
2Mb Module Model 80's	CALL
Model 70-E61;-121	$185
4Mb Memory Module	CALL
Model's 55, 65, Adptr Bds	
2, 4Mb Memory Modules	CALL
Model's 90, 95	
2-16Mb Exp Boards	CALL
Models 50, 60, 70 & 80	

IBM PS/2 CPU Upgrade

386SX Accelerator Upgrade	
Model's 50, 50z, 60	CALL

IBM LaserPrinter Memory

1, 2, 3.5Mb Upgrades	CALL
IBM LaserPrinter 4019, 4019e	

IBM RISC 6000 Memory

16, 32Mb Upgrade Kits	CALL
Series 320, 530, 550	

COMPAQ Memory

1Mb Add-On Module	$153
4Mb Add-On Module	$387
DeskPro 386/20, 25, 20e, 25e	
2, 8Mb Add-On Modules	CALL
DeskPro 486/25, 386/33, SystemPro	
32Mb Memory Module	$9,999
DP 486/25, /33, 386/33, SystemPro	
1, 2, 4Mb Memory Modules	CALL
LTE286, 386s/20; SLT286, 386s/20	
Memory Expansion Board	$136
DeskPro 286N, 386N	
1, 2, 4Mb Memory Modules	CALL
DeskPro 286N, 386N	

AT&T Server Memory

4, 16Mb Upgrades	CALL
Star Server 486/33 E	

Data General Aviion

4, 8, 16Mb Upgrades	CALL
Terminals & Servers	

NEC Memory

1,2Mb Memory Board	CALL
PowerMate SX Plus	
2-10Mb Upgrades	CALL
PowerMate SX/20	
1,2,4,8Mb Upgrades	CALL
ProSpeed 286, 386	
1, 4Mb Memory Upgrades	CALL
ProSpeed SX/20	

HP LaserJet Memory

For Models II, IID, IIP, III, IIID	CALL

HP Computer Memory

For Vectra's, 9000 Series	CALL

Toshiba Laptops

2Mb Upgrades	$240
Models 1600,3100e,3100SX, 3200SX, 5100, 5200	
1, 2Mb Upgrades	CALL
Models 1000SE, 1000XE	

5-YEAR WARRANTY! - 24-HOUR REPLACEMENT
IMMEDIATE DELIVERY! - SUPERIOR QUALITY & SERVICE

Apple, AST, AT&T, Canon, DEC, Dell, Epson, SUN, Zenith, Others

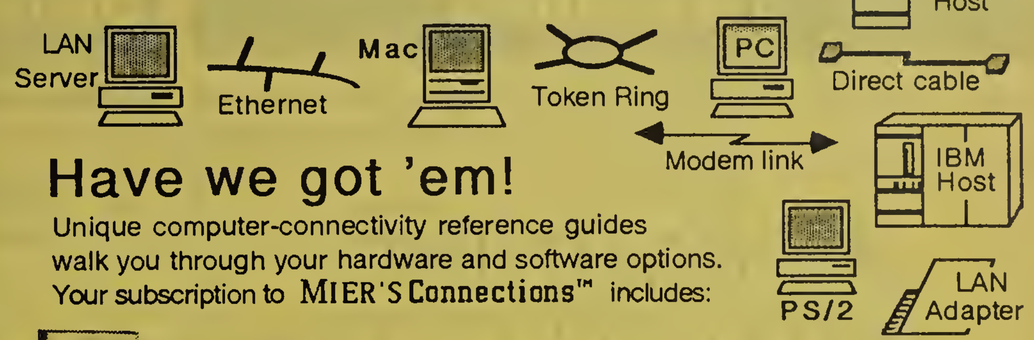
Σ **SIGMA DATA**
Established 1980
Scytheville Row • P.O Box 1790 · New London NH 03257
NH (603)526-6909 FAX (603)526-6915

TOLL FREE
800-446-4525
VISA, MC, AMEX, COD, Qualified PO's

Circle Reader Service No. 14

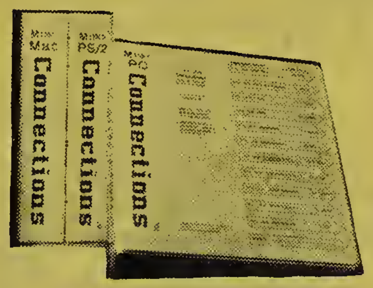
NETWORK REFERENCE SERVICE

Need connectivity answers?



Have we got 'em!

Unique computer-connectivity reference guides walk you through your hardware and software options. Your subscription to MIER'S Connections™ includes:



- Quarterly updates
- Hundreds of connectivity scenarios — via LAN, phone line, direct cable, and more
- Detailed diagrams of all necessary software and hardware components
- Fax-in service for unanswered questions
- Technology overviews — track the trends

Call for detailed brochure
and sample packet
609-275-7311
Fax 609-275-8813

MIER
Communications Inc.
99 Hightstown Rd., Princeton Jct., NJ 08550

Circle Reader Service No. 11

MODEM

The Top End for Your Bottom Line

$ 2395

Gandalf Introduces the LH19K Modem!

At any distance, the LH19K Modem offers exceptional features and fast transmission (19.2 Kbps) backed by proven technology from Gandalf, a market leader in data communications products and information systems.

The LH19K will reduce your costs by decreasing the number of leased lines and the amount of transmission equipment needed by providing dual channel capability. Asynchronous and synchronous operation and controlled carrier support operation are also included in the many features of the LH19K Modem-- the best value available in the market!

Gandalf's responsive customer service and technical support provide additional value to our products and are committed to your network running with maximum efficiency. The LH19K Modem and Gandalf Data Inc.— the top end for your bottom line.

For more information or to have a salesperson contact you, call 1-800-GANDALF.

gandalf

Circle Reader Service No. 10

NETWORK SCANNING & MONITORING

Cable Scanner

Pinpoint Network Cable Faults Fast!

The Scanner is a monitor, fault finder, cable locator and much more. Helps you pinpoint the location of shorts, opens or breaks. Its 32 character display reports the fault in plain English "short at 306 ft". With an oscilloscope, Scanner's high speed, pulse generating circuitry gives a detailed view of the entire LAN including transceiver, terminator and multiple faults.

- Cable length measurements
- Locate breaks, shorts, opens, bad crimps, etc.
- LAN activity monitoring
- Find cables in ceilings, walls, floors
- Cable TV troubleshooting
- Generate as-built drawings and specifications
- Isolate faulty network interface cards
- Very simple to operate

Included is Tracer for locating exactly where in the floor, ceiling, wall or patch panel the cable lies. Cable Scanner, Tracer and Operators' Manual are only $1495.

M-Test Equipment
P.O. Box 460008
San Francisco, CA 94146-0008

Call for Info

Outside CA: (800) 334-4293
Inside CA: (415) 861-2382
FAX: (415) 864-1076

Circle Reader Service No. 12

NETWORK CABLES

No Double Talk: No Cross Talk!

Because the Mohawk LAN cable Wise Components stocks is double shielded. This means transmission is protected from any electrical noise…and with data pairs individually shielded, there can't be any cross talk.

Mohawk cable is tested by UL to ensure that all IBM specifications are met. It's also tested in accordance with EMI/RFI requirements for elimination of signal interference.

We stock many types of Mohawk cable for network systems, so call now to get Wise's superior service.

And there's no double talk about that, either!

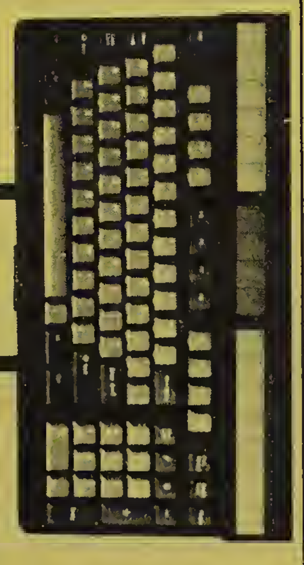
WISE COMPONENTS, INC.
28 Henry Street
Greenwich, Conn. 06830
MOHAWK

800 543 4333 • In Conn. 800 852 8557 • Fax: 203 531 4859

Circle Reader Service No. 15

PC BASED PROTOCOL ANALYZER

A PC-based protocol analyzer that's serious about portability.



The LM1® is a PC-based protocol analyzer with a lot of get up and go. In a laptop, it weighs less than 15 pounds. You get maximum portability so you can zero in on problems in the shop or in the field. The remote option lets you monitor off-site lines, and captured data can be analyzed on any PC.

The LM1 gives you in-depth plain English decodes, BERT/BLERT testing, time stamping, and interactive simulation.

We're serious about performance and portability. Call us at (708) 574-3399.

Progressive Computing

Progressive Computing, Inc.
814 Commerce Drive, Suite 101
Oak Brook, IL 60521 USA
(708) 574-3399 FAX (708) 574-3703

LM1 is a registered trademark of Progressive Computing, Inc.

Circle Reader Service No. 13

NETWORKING MARKETPLACE

TRAINING

T1 TRAINING WITH RESULTS!

Set aside a few days in January for intensive training in T1 concepts, diagnostics and troubleshooting from the network industry leader with a proven track record — N.E.T.™

Classes are taught by telecommunications professionals in state-of-the-art labs at N.E.T. facilities in Redwood City, CA and Vienna, VA. Courses develop a thorough understanding of T1 from basic theory to the underlying principles of troubleshooting and testing, and offer extensive hands-on experience with actual network systems.

DON'T MISS THIS OPPORTUNITY

Next classes offered:

January 9 -- 11
San Francisco Bay Area

January 23 -- 25
Washington, D.C. Area

For information or reservations
CALL TODAY: (415) 780-5289

NETWORK EQUIPMENT TECHNOLOGIES™

Network Equipment Technologies, 800 Saginaw Drive, Redwood City, CA 94063
N.E.T., Network Equipment Technologies and the N.E.T. logo are
Trademarks of Network Equipment Technologies, Inc.

TELETUTOR®

COMPUTER-BASED TRAINING

LAN
X.25
T1

FOR **FREE** CATALOG
OF ALL OUR COURSES
CALL
1-800-542-2242
(603) 433-2242

TeleCommunications Training Monthly

VIDEO TAPE
Training & Industry News

New subject every month including:

- X.25 Protocol Analysis
- SDLC/SNA Protocol Analysis
- ISDN BRI "The Basics"
- Switched Telephone Circuit Basics
- T1-Carrier
- Network Topology
- Local Area Network Protocols
- DataCom Concepts (RS-232-C)
- Analog Line Measurements

Call for Demo Tape
(215) 598-3293

The following advertisers appear on the FAXNeT form on page #: 58

N.E.T.	Teletutor
Tel. Training Monthly	UniForum

DATA COMMUNICATIONS

RJE FOR PC's

Complete Bisync 2780/3780 and SNA 3770 RJE emulation for PC's and PS/2's. Execute batch jobs automatically to or from your IBM host in JES2/3. Featuring...

- IBM Mdl 3777-1 support
- Up to 19.2K bps thruput
- Unattended operations
- Printer, card punch and console support
- Data compression and transparency
- PC-to-PC connectivity

Full warranty • *Immediate delivery*

From as *low as* $249
Call (800) 767-4844 today!

SELL OR TRADE YOUR SURPLUS
modems, mux's, data pbx, etc.

REPAIRS • UPGRADES • INSTALLATION • CABLING

MICOM. codex
paradyne AT&T
IBM Racal-Milgo
ARK CASE/Datatel
Universal Data Systems General DataComm

NEW AND USED EQUIPMENT BACKED BY WARRANTY
NATIONWIDE SERVICE, MAINTENANCE AND INSTALLATION

we need to buy

- TIMEPLEX MULTIPLEXORS
- UDS 208 AB MODEMS
- CODEX 208 AB MODEMS
- MICOM BOX 2 MUX'S
- GDC MEGA SWITCH

call us...

(201) 586-3070 FAX 586-3080

Warwick DATA SYSTEMS, INC.
66 FORD ROAD, DENVILLE, NEW JERSEY 07834

OSI and GOSIP Product Analysis and Planning Guide 1990-1993 A Network World/ Mier Communications Report

OSI and GOSIP product strategies for over two dozen top vendors, including DEC, H-P, IBM, AT&T, NCR, Sun and others.

*Vendor interoperation analysis
*Product customization and configuration needs
*GOSIP compliance needs
*X.400 and FTAM support
*Price trends

Single copy price: $695
VISA, MasterCard or money orders

CONTACT:
Cheryl Tynan
Network World Special Reports
161 Worcester Road
Framingham, MA 01701
(800) 622-1108, In MA (508) 875-6400

SOFTWARE

Open Systems & UNIX

- 270 UNIX System Exhibitors
- Biggest UNIX Event of the Year
- FREE Workshops Daily
- Complete Conference Program
- REGISTER NOW!

Call: **800-323-5155**
for complete details
(708-299-3131 in Illinois & outside U.S.)

UniForum™
The International Conference of UNIX® Systems Users

January 22 – 24, 1991
INFOMART ▪ Dallas, Texas

NETWORKING CAREERS

County of San Diego
Deputy Director, Information Services
(Telecommunications)
$59,114 to $81,328

This executive will manage a staff of 130 with direct responsibility for the sustaining maintenance and development of the County's voice, data, video, radio and microwave communication services. Experience with Northern Telecom SL-1's and Meridian M-1 PABX, SNA data network management and video production services along with a strong understanding of enabling service capacity planning is preferred.

For resume submittal form and recruitment brochure detailing the employment process, benefits and background requirements, please contact the County of San Diego, Department of Human Resources, 1600 Pacific Highway, Room 207, San Diego, CA 92101; phone (619) 236-2191 or 531-5100. Filing deadline is Friday, January 4, 1991.

Need to Hire Quality Networking Professionals?

NETWORKING EMPLOYMENT SOLUTIONS delivers your detailed recruitment message directly to people with the qualifications YOU select, and pre-screens respondents with YOUR questions.

The result is qualified candidates who understand and meet your basic hiring criteria, at a FRACTION of what you usually spend on print advertising or recruiter's fees!

- Not a Recruitment Agency.
- Precision-targeted direct mail recruitment advertising plus candidate pre-screening, drawing on our exclusive current database of over 100,000 networking professionals nationwide.

Want to know how many candidates fit your specific hiring criteria? Call toll-free (800) 333-1666 and ask for an NES account executive. We'll do a preliminary search and show you the results at NO COST!

NETWORKING employment SOLUTIONS
A Cooperative Service of Help Wanted On-Line and Network World

NETWORKING RESOURCE DIRECTORY

Network World's Resource Directory is sold on a 26-week basis and is net priced for that period. A line listing is company name and telephone number. Display listings, copy of your choice, are available in four sizes.

Line Listing Rates

Company listing	$500.	10 or more additional listings	$400. per listing
2-9 additional listings	$450. per listing	Bold listing — extra	$ 50. per listing

Display Listing Rates

2 5/16″ wide x 1/2″ deep	$1,000.	2 5/16″ wide x 1 1/2″ deep	$2,800.
2 5/16″ wide x 1″ deep	$2,000.	2 5/16″ wide x 2″ deep	$3,600.

Space and copy closing for next updated issue is November 20. Listing begins in December 10 issue and runs through the June 10, 1991 issue.

For more information, or a complete list of headings, call Eleni Brisbois, at 1-800-622-1108 or fax 508-651-1853. Mailing address *Network World*, Eleni Brisbois/Resource Directory, 161 Worcester Road, Framingham, MA 01701-9172.

Computers/Peripherals

Facsimile Machines

GammaLink	408-744-1430

Memory Upgrades

MEMORY UPGRADES

IBM, COMPAQ, AST, DEC, EPSON, HP NEC, SUN, TOSHIBA, ZENITH, Others

5 Year Warranty - Immediate Delivery!

Σ SIGMA DATA
Established 1980
New London, New Hampshire
CALL FOR OUR PRICE LIST

800 446-4525

Data Communications

Data Compression Equipment

RAD Data Communications Inc.	201-587-8822

Diagnostic Test Equipment

Analog Line Testers

Navtel Inc	**416-479-8090**
3M Dynatel Systems Division	**800-426-8688**

Cable/Interface Testers

Navtel Inc	**416-479-8090**

Centralized Network Management Systems

AR Division, Telenex Corp.	**800-368-3261**
Communication Devices, Inc.	800-359-8561
DIGILOG/CXR	**215-628-4530**

Error-Rate Measurement Equipment

Navtel Inc	**416-479-8090**
3M Dynatel Systems Division	**800-426-8688**

Optical Fiber Test Equipment

3M Photodyne Inc	**805-388-8378**

Performance-Measurement Equipment

Navtel Inc	**416-479-8090**
3M Dynatel Systems Division	**800-426-8688**
Tektronix/LP Com	**800-826-8675**

Protocol Analyzers

SNA 3270/LU6.2 Tests

- 3800 + Validation & Load Tests
- SDLC and Token-Ring • PC-Based
- Specs and Source Coding Provided

Applied Computer Technology
Garland, TX (214) 271-6550

TEST YOUR NETWORK WITH THE BEST

OUR PROTOCOL ANALYZERS

* Test Networks at Higher Speeds
* Are Easier to Use with EASY-VIEW®
* Are More Powerful and Flexible
* Test ISDN, T1, SS#7, SNA, X.25,...

AR
CALL 1-800-368-3261
(In Virginia 703-644-9190)
AR DIVISION OF TELENEX

Protocol Analyzers cont.

Azure Technologies	800-233-3800
DIGILOG/CXR	**215-628-4530**

IBM MAINFRAME EMULATION
SNA/3270 CERTIFICATION

- Over 500 preprogrammed QA tests to CERTIFY Controllers, Printers, Keyboards & Terminals
- LOAD & THROUGHPUT Testing
- NPSI/QLLC/X.25 Testing • PU2.1 Testing
- Token Ring Testing • LU6.2 Testing

GSOFT SYSTEMS, Inc.
7221 Mountaindale Rd., Frederick, MD 21701
301-898-7973

Hewlett-Packard Company Colorado Telecomm Div	**719-531-4414**
Navtel Inc	**416-479-8090**

Testing Experts

- Protocol/Performance Analysis
- BERT & Digital Link Testing
- Analog Impairments Testing
- Breakout Boxes for all interfaces

(800) 2-NAVTEL
FAX: 416/475-6524
Navtel
Better by design

Tektronix/LP Com	**800-826-8675**

Protocol Analyzer

- Full Dual Port Operation
- 40-Megabyte Hard Disk Drive
- Capability to 256 Kbps

Call 1-800-826-8675 for full details from

Tektronix®
COMMITTED TO EXCELLENCE

205 Ravendale Drive, Mountain View, CA 94043

Telenex Corporation	**800-222-0187**

Protocol/Interface Simulators

GSOFT Systems, Inc.	**301-898-7973**
Navtel Inc	**416-479-8090**

DSU/CSU

Anixter	**800-343-5142**
RAD Data Communications Inc.	201-587-8822

Front-End Processors

Simpact Associates, Inc	**619-565-1865**

Microwave

Motorola Microwave	**800-962-1826**
Racon, Inc.	800-426-5245

Use Network World's Resource Directory every week to buy or sell networking products and services.

Modems

Limited Distance/Line Drivers

RAD Data Communications Inc.	201-587-8822

High Speed (9.6kbps+)

Anixter	**800-343-5142**
Western Datacom Co. Inc.	800-262-3311

Fiber Optic

Canoga-Perkins Corp.	**818-718-6300**
RAD Data Communications Inc.	201-587-8822

Multiplexers

Fractional T-1

AYDIN CONTROLS

MULTIPLEXERS AND 4:1 TRANSCODERS

- Full and Fractional T1 Rates
- Toll Quality Voice / High Speed Data
- Handles 9.6 Kbps Modem and Group III FAX

Call 1-800-366-8889

414 Commerce Drive • Fort Washington, PA 19034-2602

COASTCOM	**415-825-7500**

Optical Fiber

Anixter	**800-343-5142**
Canoga-Perkins Corp.	**818-718-6300**
RAD Data Communications Inc.	201-587-8822

Statistical

RAD Data Communications Inc.	201-587-8822

Time Division

RAD Data Communications Inc.	201-587-8822

T-1

Anixter	**800-343-5142**
Canoga-Perkins Corp.	**818-718-6300**
RAD Data Communications Inc.	201-587-8822

Network Management Systems

AR Division, Telenex Corp.	**800-368-3261**
Communication Devices, Inc.	**800-359-8561**
Dynatech Communications	703-550-0011
Micro Technology	714-970-0300

Patching Equipment

AR Division, Telenex Corp.	**800-368-3261**
Telenex Corporation	**800-222-0187**
3M Private Network Products	**800-745-7459**
Thomas & Betts Corporation	**908-685-1600**

Switches

Data

Wise Components Inc.	800-543-4333

Matrix

Datacomm Mgmt Sciences	203-838-7183
Dynatech Communications	703-550-0011
Telenex Corporation	**800-222-0187**

Packet

Amnet, Inc.	508-879-6306
OST, Inc.	**703-817-0400**

Port Selectors

RAD Data Communications Inc.	201-587-8822

Systems Integrators

GLASGAL COMMUNICATIONS, INC.

We wrote the book on systems integration!

Providing ALL your network needs through optimized design, installation, integration and maintenance of products and services from over 130 top LAN and WAN manufacturers.

Worldwide Headquarters (201) 768-8082

Systems Integrators cont.

PDI
Potomac Digital, Inc.
(301) 840-0999
FAX: (301) 417-0593

POTOMAC DIGITAL, INC. is a full service distributor and integrator of Networks, with an extensive inventory of WAN/LAN Products from:

AT&T PARADYNE
MICOM COMMUNICATIONS
NEC AMERICA, INC.
WELLFLEET
LANTRONIX
FIBER OPTIC PRODUCTS

StonyBrook Technologies, Inc.	**516-567-6060**

Terminal Emulation Boards

Avatar Corporation	800-282-3270

Terminal Servers

Datability Software Systems	**800-DIALDSS**

VISTA
Terminal Server

(1-800 DIAL-DSS;
in N.Y., 212-807-7800)

* 8 to an Unprecedented 128 Ports
* TCP/IP and LAT Compatible
* 8 Hayes-Compatible *Internal* Modems
* Full Function X.25 PAD

Local Area Networks

Bridges

Anixter	**800-343-5142**
CrossComm	**508-481-4060**
EICON TECHNOLOGY CORP.	514-631-2592
Interlink Computer Sciences	415-657-9800

Netronix.

The Second Generation Of Ethernet and Token Ring Bridges. 1-800-282-2535

Netronix
Technology That Works.™

RAD Data Communications Inc.	201-587-8822

LAN/WAN Bridges

Advanced Relay Comm., Inc.	503-345-9178

Brouters

RAD Data Communications Inc.	201-587-8822

Gateways

EICON TECHNOLOGY CORP.	514-631-2592
Interlink Computer Sciences	415-657-9800
Simpact Associates, Inc.	619-565-1865
StonyBrook Technologies, Inc.	**516-567-6060**

Installation Services

Coluccio Associates Inc	**212-908-5421**
GE Network Service	**800-726-4327**
Solunet Inc.	800-828-0151

Local Area Networks

Broadband Based

Anixter	**800-343-5142**

Ethernet Compatible

Anixter	**800-343-5142**

ANIXTER
Wiring Systems Specialists
Voice • Video • Data • Power

digital™
Authorized Distributor
800-343-5142

DuPont-Electro-Optic Products	**800-888-LAN1**
Wise Components, Inc.	800-543-4333

NETWORKING RESOURCE DIRECTORY

Fiber Optic Based

Anixter	**800-343-5142**

10BaseT Systems

DuPont-Electro-Optic Products	**800-888-LAN1**

Token Ring

Anixter	**800-343-5142**

Token Ring Compatible

DuPont-Electro-Optic Products	**800-888-LAN1**

LAN Services

ExpertWatch

A unique service that monitors
your LANs 24 hrs a day, 7 days a
week so that you don't have to.

CrossComm Corp. (508) 481-4060

LAN/Mind, Inc.	800-325-5267

LAN Test/Management Devices

DIGILOG/CXR	**215-628-4530**
Hewlett-Packard Company Colorado Telecomm Div	**719-531-4414**
Tektronix/LP Com	800-826-8675

Routers

Anixter	**800-343-5142**
Interlink Computer Sciences	415-657-9800

Security

Encryption/Decryption Devices

GN Telematic, Inc.	508-667-8644

Software

Application Development Tool Kit

Proteo Software Inc	800-668-6716

Cable Management

Network Facilities	612-934-2655

Communications

Simpact Associates, Inc.	619-565-1865

FAXGate™
Facsimile Gateway for IBM Mainframes
FILEGate™
File Transfer Gateway for IBM Mainframes
Teubner & Assoc. 800-343-7070 405-624-2254

EMail/Messaging

Notework Corporation	617-734-4317

Facilities Management

CHI/COR Info. Management	312-454-9670
DIGILOG/CXR	**215-628-4530**
Telco Research Corporation	800-48T-ELCO
XTEND COMMUNICATIONS	212-725-2000

Micro-to-Mainframe

EICON TECHNOLOGY CORP.	514-631-2592
StonyBrook Technologies, Inc.	**516-567-6060**

Network Management

Communication Devices, Inc.	800-359-8561
CrossComm	**508-481-4060**
DIGILOG/CXR	**215-628-4530**

Storage Devices & Media

Computer Room Equipment

Controller Stacking Frames

Data Connections, Inc.	**919-668-1077**

Structured Wiring Systems

Baluns

Anixter	**800-343-5142**
RAD Data Communications Inc.	201-587-8822
The Siemon Company	203-274-2523
Thomas & Betts Corporation	**908-685-1600**

Baluns cont.

TRANSITION
ENGINEERING, INC.
The most complete selection of UTP
and STP Baluns shipped from stock.
3270 • AS/400-3X • Arcnet • Ethernet
Type 3 Media Filters • Panels • Testers
Active Hubs • Passive Hubs • Adapters
(800) 325-2725 (612) 941-7600
Made in USA
= *Higher Quality + Better Service + Wider Selection*

Wise Components, Inc.	800-543-4333

Cables

Coax

Anixter	**800-343-5142**
Wise Components, Inc.	800-543-4333

Fiber Optic

Anixter	**800-343-5142**

CHROMATIC
TECHNOLOGIES, INC.
31 Hayward Street, Franklin, MA 02038
508/520-1200 * FAX 508/520-0698
The most valuable fiber optic cable.

Siecor Corporation	704-327-5189
3M Private Network Products	**800-745-7459**
Wise Components, Inc.	800-543-4333

Twisted Pair

Anixter	**800-343-5142**
Wise Components, Inc.	800-543-4333

Connectors

Anixter	**800-343-5142**
3M Private Network Products	**800-745-7459**
Thomas & Betts Corporation	**908-685-1600**
Wise Components, Inc.	800-543-4333

MOD-TAP®
Total Wiring Solutions
from
YANKEE
1-800-365-9720 FAX: 603-625-4915

Cross Connect Blocks

Anixter	**800-343-5142**
3M Private Network Products	**800-745-7459**
The Siemon Company	203-274-2523

Wiring Concentrators

Anixter	**800-343-5142**

Support Equipment

Power Distribution/ Equipment Protection

BATTERY BACK-UP for NETWORKS
BEST PRICES
1-800-433-2288 The PURSUIT Corp.

Secondary

The Siemon Company	203-274-2523

UPS

3M Private Network Products	**800-745-7459**

Support Services

Consulting

Business Software Inc.
Specialists in multi-media network
documentation
- Setup • Maintenance
- Training • Network Planning

Call: (212) 753-5333

Consulting cont.

LAN/Mind, Inc.	800-325-5267
Multi-Tech Communications	**201-627-2518**

PRISM TECHNOLOGY INC.
NetWare 386/286 Consulting
Client/Server Applications
Sales & Installation
NOVELL
AUTHORIZED RESELLER
(617) 241-0451

Telco Research Corporation	800-48T-ELCO
XTEND COMMUNICATIONS	212-725-2000

Educational Training Services

Data Communications

Business Communications Rev.	**708-986-1432**
ICA	800-422-4636

E-Mail Training

Westcon Training Centers	**800-873-6040**

IBM: SAA/SNA

Galaxy Consultants	408-354-2997

LAN

Business Communications Rev.	**708-986-1432**
ICA	800-422-4636
Westcon Training Centers	**800-873-6040**

Novell

LAN/Mind, Inc.	800-325-5267
PTXI	**800-783-PTXI**
Westcon Training Centers	**800-873-6040**

Telecommunications

Business Communications Rev.	**708-986-1432**
ICA	800-422-4636

3COM

PTXI	**800-783-PTXI**

Installation Services

GE Network Service	**800-726-4327**

Novell Sales and Service
Installation - cabling - maintenance
Novell Authorized Training
CNE Training
Network Systems & Services
160 5th Ave. NYC - 212/691-2680

PCC
Pacific Coast Cabling, Inc.
Installation Specialists
Communications Cabling & Equipment
Data, Voice & Video Prewire Services
LANS WANS
Serving Southern California Since 1985
21610 Lassen St., Chatsworth, CA 91311
(818) 407-1911 Lic# 486194

Solunet, Inc.	800-828-0151

Lease/Resale Organization

SOURCE Telecommunications	**214-450-2700**

VSAT Installations

DOWNL INC.
NATIONAL VSAT INSTALLATIONS GROUP
1777 SOUTH BELLAIRE STREET • DENVER, CO 80222
(303) 756-0031 FAX (303) 756-9011

Telecommunications/ Voice

Call Accounting

DIGILOG/CXR	**215-628-4530**

Call Accounting cont.

Telco Research Corporation	800-48T-ELCO
XTEND COMMUNICATIONS	**212-725-2000**

Key Systems

SOURCE Telecommunications	214-450-2700

Fax Processing Systems

Biscom	800-477-2472

e^{π} FAX RELAY

The FR-100 FAX RELAY connects a Group III facsimile machine via a PBX extension to the data port of a multiplexer. The FR-100 puts fax transmission over your dedicated data network using only 9600 or 4800 bps.

(408) 973-9800
Entropic Speech, Inc.

The FAX Group	**619-792-6400**
GammaLink	**408-744-1430**

ISDN Products

Anixter	**800-343-5142**
Hewlett-Packard Company Colorado Telecomm Div	**719-531-4414**

PBXs (under 200 lines)

SOURCE Telecommunications	214-450-2700

Microwave Transmitters/Receivers

Motorola Microwave	**800-962-1826**
Racon, Inc.	**800-426-5245**

Voice Response

Syntellect Inc.	**602-789-2800**

VSAT Customer Premises Equipment

Scientific-Atlanta, Inc. Private Networks Business	407-255-3000

Transmission Services

Dedicated Lease Line

Communications Transmission.	**800-272-9CTI**

Facsimile

GammaLink	**408-744-1430**

Microwave

FCC Licensed Digital Microwave
Carrier • Bypass • Alternate Access
• Disaster Recovery/Diversity
(212) 509-5115 LOCATE
17 Battery Place, Suite 1200, NY, NY 10004

Motorola Microwave	**800-962-1826**
Racon, Inc.	800-426-5245

Packet Switching

Dynatech Communications	703-550-0011
StonyBrook Technologies, Inc.	**516-567-6060**

VSAT

CSA-VSAT Consultants	408-996-0585
GTE Spacenet Corporation	703-848-1000
Scientific-Atlanta, Inc. Private Networks Business	407-255-3000

Wide Area Networks

Concentrators

Amnet, Inc.	508-879-6306

Network Switches

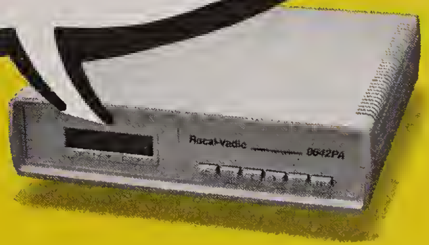
Amnet, Inc.	508-879-6306

Let me tell you **everything** you've always wanted to know about **V.32** modems and your **network**. I'll send you my free **"High Speed Dial-Up Modem Handbook*"**. Or, information on the entire **Racal-Vadic** V.32 family, including me, the **9642PA** Motor Mouth. I can even have a salesperson call you right away! Just check the appropriate box(es) below or call **1-800-482-3427**.

☐ Send the "High Speed Dial-up Modem Handbook*".
☐ Send more info on the Racal-Vadic V.32 family.
☐ Have a salesperson call.

Name ____________________
Company ____________________
Title ____________________
Phone ____________________
Address ____________________
City, State, Zip ____________________
Preferred Distributor ____________________

*Handbook offer available until April 1, 1991.



Racal-Vadic
THE DIAL-UP AUTHORITY

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 1047 MILPITAS, CA

POSTAGE WILL BE PAID BY ADDRESSEE

Racal-Vadic

V.32 Hotline
1708 McCarthy Blvd.
Milpitas, CA 95035

AT&T to phase out MLW plan

continued from page 13

tion date with requests to cancel or renew their MLWs. AT&T will automatically renew MLWs for the length of the original service period if it does not receive this notification, the filing stated.

In a separate filing, AT&T proposed for the first time to make many of its advanced 800 features available to Megacom 800 and Readyline 800 users.

AT&T proposed offering Feature Package-1, an AT&T Advanced 800 routing package, with its Megacom 800 service. Feature Package-1 includes 800 Single Number, 800 Area Code Routing, 800 Time Manager and 800 Day Manager features. The change would take effect on Dec. 31.

The 800 Single Number service lets users use one toll-free number nationwide for in-state, interstate and Canadian calls.

Users with multiple call centers can employ 800 Single Number service with 800 Area Code Routing, which enables users to route calls to multiple call centers according to the caller's area code.

With 800 Time Manager, users with call centers in multiple time zones and companies with after-hours operations can change routing patterns by the time of day. The offering works with all other 800 routing features.

AT&T's 800 Day Manager feature enables users to set up special 800 routing plans for different days of the week. It works with all other routing features.

In order to promote use of Feature Package-1, AT&T is waiving its network arrangement charge of $114 per feature for Megacom 800 and Readyline 800 customers that sign up for the package between Jan. 1 and April 1, 1991, and have it installed no later that April 30. Customers can use Feature Package-1 offerings as often as needed for a maximum of $1,500 a month per 800 number.

Retix to make mark on market

continued from page 9

Retix backpedaled and devised a strategy in which it would strike agreements with a number of providers of applications and E-mail to link their products to OpenServer 400.

Launched last February, the company's OpenServer Partnership Program now includes agreements with 15 vendors — among them, cc:mail, Inc., DaVinci Systems Corp., Novell, Inc., Oracle Corp. and WordPerfect Corp. Under the program, application providers agreed to license Retix's X.400 application program interface to connect their E-mail systems to the OpenServer 400 and use it as a gateway to X.400 networks.

"For the first time, you've got vendors agreeing to link PC LAN mail systems to mail programs running on IBM mainframes and DEC VAXes, not just on a LAN-to-LAN basis," Frankel said. "Those are real-world benefits to users because 70% of all E-mail flows from IBM or DEC machines."

To date though, only one product supporting OpenServer 400 has made it to market. Enable Software, Inc. has shipped third-party supplier ProtoComm, Inc.'s X.400 gateway for use with Enable Software's Higgins E-mail software. However, cc:Mail's cc:Mail Link to X.400 is set to ship this month, Jung said, adding that WordPerfect's WordPerfect Connections Retix X.400 Gateway and Oracle's Oracle*Mail are in beta test.

Industry analysts say Retix has picked the right time to enter the end-user OSI market and is positioned to serve customers with an array of X.400 software, as well as virtual terminal and file transfer products.

"The time is right to do this. It's a smart move for Retix," said James Herman, a principal with Northeast Consulting Resources, Inc.

Frankel said the end-user push should help Retix meet its 1990 goal of $50 million to $55 million in revenue, a healthy jump over 1989 sales of $35 million.

"We think we're well positioned to serve end users," Frankel said. "The GOSIP market's here, and we're making moves into that sector. We're confident we have the product to link disparate LANs and high-end systems via X.400."

MOTOR MOUTH.

Ever wonder how much you could say if you could speak **really** fast? **Twice as fast** as you can now? **Quadruple** that, and you're up to speed with me. I'm the **Racal-Vadic 9642PA**, and I'm **the** __**last**__ **dial-up modem your network will ever need.**

How do I know? For starters, my exclusive "**Extended V.32**" feature boosts ordinary V.32 9600 bps throughput to a full **14,400 bps** on ordinary **dial-up** lines! And sure, I could slow down to a **full-duplex** 12000, 9600, 4800, 2400, 1200, or 300 bps. But only if I have to.

Besides, I support the data comm **standards** you need most. Like the **new** CCITT **V.42** error correction and **V.42*bis*** data compression specs. As well as **MNP® classes 2-5** error correction and data compression. I'm also compatible with other popular standards, **including** V.22*bis*, V.22 and V.21, Bell 212A and 103, plus Bell 208A and 208B, too.

If I had **more** time, I'd **boast** about my **countless** other virtues. Like dial-up, and **2- or 4-wire leased line** support. V.33 with single call **automatic dial-backup and restoral** at 14.4 Kbps. V.25*bis* and Hayes® autodialing. **Remote modem control**. Built-in **callback security**. Even my noninterruptive **network management** capabilities. And when you want me to change my ways, just give me a poke on my **front panel controls.**

Now that's a **mouthful**. And it's just the tip of the iceberg. Find out more about yours truly, the **9642PA**, and my **rack-mountable twin**, the **VA9642E** — two complete modems on one card.

Call 1-800-482-3427, and ask for the name of your nearest **Racal-Vadic** distributor.

OK, enough talk. Now back to **work**...

Ssscccccrrrreeeeeeeeeecccchhh!!!

RACAL
The Electronics Group

Racal-Vadic
THE DIAL-UP AUTHORITY

© 1990 Racal-Vadic, 1708 McCarthy Blvd., Milpitas, CA 95035 • Tel: (408) 432-8008 • Fax: (408) 434-0188. All products or brand names listed are trademarks or registered trademarks of their respective holders.

See the FAXNeT Form on Page 58

LAN Server gets high marks

continued from page 2

A 66M-byte data file was transferred between two IBM Personal System/2 Model 80 servers in less than five minutes.

"That's more than twice as fast as I would have expected," Beckley said, based on reports about MS-Net, Microsoft Corp.'s earlier generation operating system whose DOS file system was used in early releases of OS/2-based LAN Manger. LAN Server is based on Microsoft's LAN Manager.

"Traditionally, MS-Net NETBIOS-based LANs have been slow, particularly compared to [Novell, Inc.'s] NetWare," he said, "so we didn't think we were going to have a barn burner."

The hospital selected the IBM product over NetWare because it needed built-in NETBIOS support for its data base applications, Beckley said. NetWare uses NETBIOS emulation, which would have been acceptable in less demanding applications, but the hospital's data base servers could each eventually support 200 personal computers.

Although he generally praised the product, Beckley cited a printing problem. "We have an IBM laser printer attached to it, and it doesn't work right," he said. "And that's in native IBM mode."

Poor print spooling capabilities, which Beckley said are part of the OS/2 Extended Edition operating system on which LAN Server is based, are at the root of the problem. Beckley said the recently announced OS/2 Extended Edition 1.3 is supposed to address the print spooling problem.

Sony Consumer Products Group, a division of Sony Corp. of America, has also been pleased with LAN Server, according to Joe Croghan, manager of financial systems and networks for the company in Park Ridge, N.J.

Sony began working with the product roughly two years ago and is currently using LAN Server 1.2 to support a variety of applications such as E-mail, sales analysis/support and financial reporting. The latter two applications require access to mainframe data bases, including IBM's DB2 and IMS.

Seamless mainframe connectivity was a key factor in the company's move away from NetWare. "When you get into the communications side of it, you're introducing more complexities by going with multiple vendors," Croghan said.

Sony has several hundred DOS-based personal computers on a 4M bit/sec IBM Token-Ring LAN running LAN Server. "We've had no problems with LAN Server whatsoever," he said.

Croghan did, however, cite an inability to easily share printers across a network. Sony has developed a kludge solution that involves dedicating antiquated personal computers to function as print servers residing on the Token-Ring LAN.

Another early user of OS/2 LAN Server is the Bureau of Health Care and Delivery Assistance, a branch of the Health Resources and Services Administration in the U.S. Department of Health and Human Services Bureau in Rockville, Md.

LAN Server 1.2 has been used at the bureau since June to support roughly 100 personal computers on several 4M bit/sec IBM Token-Ring LANs.

Users are running server-based applications that include Lotus Development Corp.'s 1-2-3/G, WordPerfect Corp.'s WordPerfect and the built-in data base within IBM's OS/2 Extended Edition 1.2, which runs on each LAN node. They also have access to the bureau's IBM 3090 host, as well as all of the applications running on it.

Although he is generally pleased with the product, Paul Boone, LAN administrator at the bureau, said he has been frustrated by the lack of a user-friendly means of sharing printers across the LAN. He said IBM, application software vendors and printer manufacturers must develop drivers that enable multiple printer types to be shared seamlessly by users running any application on the LAN.

An IBM spokesman said the company recently announced an additional driver for third-party printing support and will begin shipping another before the shipment of LAN Server 1.3, which will be available by year end. ◘

PANEL OF EXPERTS

MultiMux™ Statistical Multiplexers

Expect substantial savings in your data communication costs when you replace your dial-up lines with a pair of MultiMux statistical multiplexers and one or two leased lines. You'll simplify your asynch communications while adding new levels of network security.

And save on equipment cost, too. Take advantage of MultiMux flexibility in linking remote user groups to LANs, without establishing expensive separate LAN systems for each distant location.

All the features and support you require. Multi-Tech's statistical multiplexers are available in 4 to 32 channel models with 9600 or 14,400 bps internal modems. Simple to install and easy to use. Plus, every MultiMux has a built-in command modem which links your MultiMux to Multi-Tech's Support Center where remote diagnostics can be performed should problems occur. And there's a toll-free helpline to get assistance whenever you need it.

Multi-Tech Systems. For twenty years, your expert data communications resource for modems, multiplexers, LAN systems and 3270 emulators.

MultiTech® Systems

The right answer every time

Multi-Tech Systems, Inc.
2205 Woodale Drive
Mounds View, Minnesota 55112 U.S.A.
(612) 785-3500 (800) 328-9717
U.S. FAX (612) 785-9874
International Telex 4998372 MLTTC
International FAX (612) 331-3180

US Sprint to serve up inband ANI feature

continued from page 1

many other users are interested in,'' said John Morrison, vice-president of voice information services for Sears Technology and vice-chairman of the US Sprint user group.

One potential benefit of inband ANI for Sears Technology is that it could give employees with workstations in their homes faster access to Sears computers by verifying employee phone numbers rather than relying on dialback mechanisms.

US Sprint charges users a onetime $200 per-location setup fee for the feature and 1 cent for each number delivered, said Maria Webb, 800 product manager with US Sprint. She added that there is no monthly charge for the feature.

In comparison, the company charges users a onetime fee of $2,000 per location and $300 a month for its ISDN PRI service, a $200 onetime charge for the service's ANI feature and 1 cent for each number delivered. Users may need to modify switch software to accept inband ANI and install devices to capture the ANI, Webb said.

Unlike ANI with ISDN, which uses out-of-band signaling and X.25 messages to deliver ANI, the inband approach uses different frequency tones to forward the information to the customer premises.

With US Sprint's inband ANI offering, the carrier's Northern Telecom DMS-250 central office switches will notify customer switches of incoming calls and then pass ANI and Dialed Number Identification Service (DNIS) codes across the circuit with the call.

US Sprint offers three types of inband ANI delivery: Dedicated Access Line (DAL) using Dual-Tone Multi Frequency (DTMF) signaling for use with PBXs; DAL Multi Frequency ANI Delivery for use with ACDs; and Feature Group D ANI Delivery, which is commonly used for resellers.

DAL using DTMF signaling can deliver either a 10-digit ANI with calls originating from equal-access central offices or the three-digit area code of calls from non-equal-access central offices, Webb explained. If the customer uses US Sprint's DNIS, it will also receive the last four digits of the 800 number dialed.

DAL Multi Frequency ANI Delivery sends users the four-digit DNIS code, followed by the ANI or the area code. This delivery scheme was designed for telemarketing service bureaus that field calls from numerous 800 numbers.

With Feature Group D ANI Delivery, the ANI is delivered over Feature Group D trunks before the four-digit DNIS code.

US Sprint's inband ANI feature varies from MCI's inband offering in that US Sprint can deliver ANI and DNIS, while MCI can only deliver ANI. Northern Telecom PBXs can receive ANI or DNIS — not both — but Webb said the switch could be modified to handle both.

Mark Koenig, a district manager for Definity product planning at AT&T, said the Definity software can be modified to allow customers to receive inband ANI. ''There's nothing that prevents Definity from receiving ANI.''

Steve Mulcahy, manager of 800 service corporate marketing for MCI, said the carrier has changed the software in its network control points (data bases that control 800 number translation) to enable it to deliver ANI and DNIS to 800 ESP users. The service is expected to be available beginning in the second quarter of 1991.

Infonet a step closer to global EDI net

continued from page 2

Australia, Telefonica Spain and Hong Kong Telecom CSL, Ltd.

Infonet plans to link its network with these and other EDI service providers starting next year, said Laura Andrus, Infonet's director of marketing for EDI products and services.

By working with Infonet, national EDI service providers will be able to offer users international EDI services without having to negotiate agreements and direct interconnections with their many counterparts around the world — a costly and time-consuming proposition that providers have avoided to date.

Infonet is able to establish such connections more easily given its international bent. The company is owned by MCI Communications Corp. and 10 foreign telecommunications administrations, and has already established service and support organizations worldwide.

During the past year, Infonet has developed a data base system that will enable it to translate different EDI protocols and a directory that will be used to route messages to addresses on any EDI net linked to Infonet. Infonet has also developed a message tracking system that enables users to call a global hot line in order to locate at a moment's notice a message anywhere on the network.

''Infonet is putting together the people and expertise necessary to establish EDI systems on an international basis,'' said Mark Winther, vice-president of electronic communication services at Link Resources Corp., a market research firm in New York. While the EDI industry in the U.S. and other parts of the world is still in its infancy, ''Infonet has put the infrastructure in place to be ready when demand for international EDI heats up.''

Infonet isn't in a big hurry to forge the interconnections with its partners because demand for international EDI has not taken off yet, Andrus said. But the carrier's goal is to establish links with EDI service providers in the 37 countries in which it maintains nodes, she said. Thus, in the next few years, Infonet will be well-positioned to handle demand for international EDI when it arises, she said.

Users, EDI service providers and analysts applauded Infonet's efforts, labeling them the first significant work by a carrier to simplify international EDI.

''Companies that are looking seriously at doing EDI internationally will have to look to value-added networks like Infonet,'' said Bobbie Bogue, director of information and computing at Zilog, Inc., a Campbell, Calif., maker of application-specific integrated circuits and an Infonet customer.

Dan Williams, vice-president of business services at Railinc, said his organization hopes to bring some international EDI users on-line next year. Railinc's EDI users swap business documents electronically with overseas customs offices and ocean carriers, among others, Williams said. But the fact that EDI standards such as ANSI X.12 are popular in the U.S., whereas the EDI for Administration, Commerce and Transport (EDIFACT) standard is more widely used overseas, has made such relationships difficult to date, he said.

WHAT DO THE FOLLOWING ORGANIZATIONS HAVE IN COMMON?

General American

UNION PACIFIC

USC

City of Phoenix

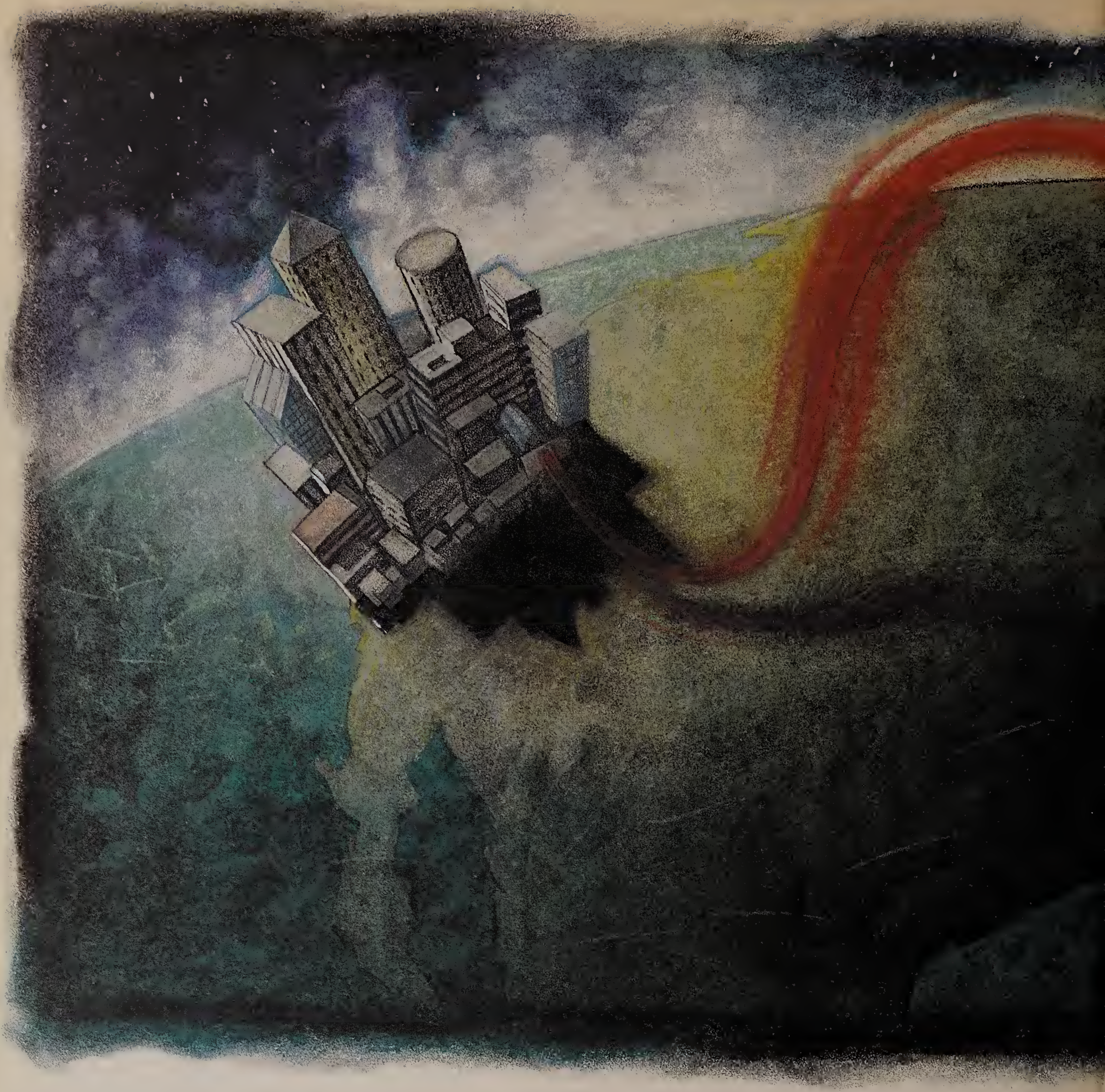
All four will share their experience with *IMAGE SYSTEM* Technology in Phoenix, Arizona, January 16-18, 1991. Why Phoenix? Simply because this will coincide with the most informative conference for companies looking to employ image system technology.

For more information on:

IMAGE SYSTEMS: BEYOND THE OBVIOUS
January 16-18, 1991
Phoenix, AZ

Call 1-800-525-5456 x-789

Sponsored by IDC/Avante Technologies, Inc., a joint venture
5 Speen Street, Framingham, MA 01701



Imagine a world where one company...

...connects the strengths of two. Where a hundred-year heritage of product quality joins with a bold spirit of innovative technological development. And a mutual commitment to helping the customer succeed creates one of the largest data communications support organizations in the world. Imagine value-added products and services that reflect a single-minded focus on customer satisfaction. Where one company's knowledge of your business connects with your own in a strategic partnership. Imagine, at last, a single connection to successful data networking. Now, imagine that one company...
AT&T Paradyne.

To find out how you can connect with success in data networking, call 1 800 482-3333 Ext. 217.
In Canada, call 1 416 494-0453.

Europe (44) 923-55550 FAX: (44) 923-55638, Japan (81) 3-245-0431 FAX: (81) 3-245-0433, Hong Kong (85) 25-430083 FAX: (85) 25-413767, Latin America (1) 813-530-2873 FAX: (1) 813-530-2575

AT&T Paradyne

See the FAXNeT Form on Page 58

RBHCs pump big bucks into U.K.

continued from page 1

ners plan to build new local loop networks that will deliver both television and telecommunication services to residential and business users.

Four of these companies — Nynex Corp., Pacific Telesis Group, Southwestern Bell Corp. and US West, Inc. — could invest a combined total of between $1 billion and $3 billion over the next several years to get their nets up and running, according to industry sources.

The RBHCs see these ventures as lucrative business opportunities and say they will gain experience merging CATV and network services on common facilities — a capability they would like to provide in the U.S. if regulators would let them.

But critics say these investments may provide yet another example of how a restrictive U.S. regulatory system could be stimulating a flight of capital.

A public telephone operator (PTO) "will invest where it can make the most profit," said Adrian Squires, PTO liaison officer with the Telecommunications Managers Association, a leading U.K. user group. "Where you have regulatory restrictions that limit what a company can do [such as U.S. line of business restrictions], you have limits on profits that will cause a PTO to look elsewhere," he said.

In their U.K. operations, the RBHCs are expected to be allowed to offer virtually any telecommunications service, including local, long-distance and enhanced services.

Building a British empire

In their zeal to exploit this freedom, the RBHCs are building a cable television and network empire unsurpassed in size by any other firms operating in the country.

According to the U.K.'s chief regulatory agency, the Office of Telecommunications (OFTEL), based here, the RBHCs now have a significant ownership stake in more than 95% of all U.K. cable television franchises.

In fact, US West and Pacific Telesis now qualify as the country's two largest cable television operators, respectively. Nynex ranks fourth, while Southwestern Bell holds the position of the 15th largest cable owner.

In each franchise, the RBHCs are splitting their ownership stake with other firms — typically CATV operators or venture capitalists. The RBHCs say they plan to focus on the network side of the business while their partners concentrate on the cable television side.

The RBHCs and their partners have acquired their franchises over the past year and a half by applying for — and winning — new licenses to supply CATV services.

In each of their franchises, the RBHCs are spending millions of dollars to build new nets because no cable television network exists in their U.K. service area. US West plans to spend $200 million over the next 10 years to get its nets up and running, according to a company spokesman.

According to John Mercogliano, director of business development at Nynex, U.K. cable franchises are a good investment because the U.K. cable television market is underdeveloped and poised for heady growth. He added that the U.K. cable enterprise will not diminish U.S. investments but instead will improve Nynex services in the U.S. by giving the company more international expertise.

Mercogliano said Nynex plans to offer virtually every network service in the U.K. that it offers in the U.S. Initially, Nynex plans to combine network traffic and television traffic on fiber-optic backbones, while running separate television and telephone copper cables out through shared ducts to homes and businesses.

The company plans to merge traffic from the separate copper cables onto shared fiber-optic cables when the cost of fiber declines, Mercogliano said.

OFTEL Director Sir Bryan Carsberg said he favors the RBHC investments because they will bring much needed competition to the U.K. and increase investments in the local loop.

A British Telecommunications PLC spokesman countered, however, saying it is unfair for the RBHCs to compete as local loop carriers in the U.K. while British Telecom is prohibited from offering switched local-loop services in the U.S.

MAP/TOP group charts course

continued from page 1

profile of OSI ever and that the time has come to tackle the issue of how corporations might successfully migrate their heterogeneous networks to OSI.

She said MAP/TOP will focus in 1991 on formulating specific transition strategies that could be used as references by corporations planning net development.

From experience

Bride, head of a network team involved in a five-year effort to migrate The Boeing Co.'s large collection of disparate nets to OSI, shared experiences with attendees at a separate technical session ("Enterprise net vision takes shape at Boeing," *NW*, Nov. 26).

At the session, titled "The Pros and Cons of TCP/IP as a Transition Strategy," Bride encouraged telecommunications managers to migrate Transmission Control Protocol/Internet Protocol networks to OSI but debunked the notion of TCP/IP as a transition to OSI.

"I have a 20,000-node TCP/IP network I have to transition from, and it's a pain in the neck," she said.

Bride noted that, while some like to point out the similarity in OSI and TCP/IP protocol stacks, the limitations of TCP/IP vs. OSI are more important.

"TCP/IP isn't a transition strategy; it's an alternative strategy," she emphasized. Bride pointed out that TCP/IP, originally a military specification and now in the public domain, never went through the battery of interoperability tests being established for OSI today.

Bride said a network manager interconnecting a large multivendor TCP/IP installation will discover that vendors have implemented TCP/IP differently and interoperability is unattainable. "You can't build a national and international network using TCP/IP," Bride said.

First step

When starting to pull together the disparate proprietary networks that Bride referred to as legacy systems, she urged network managers to first implement multiprotocol router-based backbones.

In describing some of the migration paths to a pure OSI environment, Bride pointed out that one transition approach — putting in gateways to OSI from either TCP/IP or a proprietary network — had drawbacks.

Application-layer gateways transform requests from one protocol into the corresponding commands for the other protocol, but gateways create a management bottleneck because you cannot typically manage devices on the other side of the gateway, Bride said. She noted, however, that the gateway strategy is affordable and called it "the least complex solution to an almost impossible task."

A second approach involves running mixed protocol stacks across the network. In a mixed stack approach, lower layers would be non-OSI and upper layers would be OSI, or vice versa. But such a complicated setup requires vendor agreements on how the mixed stack works across the network, Bride said.

Bride warned that during the migration to OSI, difficulties are bound to arise. "Technicians feel threatened by the change to OSI," she cautioned. But even more threatened are vendors. The transition approaches they suggest are often self-serving. "In most cases, they're trying to protect their installed base and not taking into consideration the user," she said.

U.K. users supportive of open net market policy

BRIGHTON, England — Despite their apprehension that things might not work out as planned, members of the U.K.'s top user group last week voiced enthusiastic support for recent government proposals to open the U.K. network market to full competition.

Attendees at the annual conference and exhibition of the Telecommunications Managers Association (TMA) here said users should benefit greatly from the elimination of virtually all regulatory constraints on competition in local, long-distance and international service markets ("U.K. plans for wide-open telecommunications arena," *NW*, Nov. 19).

But while they favor the reforms, many users expressed concern that vigorous competition may never emerge. Others said they are worried that foreign monopolistic carriers will take advantage of their unfettered access to the U.K. market to compete unfairly with British carriers, perhaps by using the profits from their monopolies to subsidize U.K. operations.

"We wouldn't want to throw the baby out with the bathwater," said Ernest Duff, telecommunications manager with Chivas Brothers, Ltd. in Paisley, Scotland. "We want the competition, but we don't want so much of it that we put our British firms out of business."

A net advantage

According to TMA Chairman Nick White, who also serves as director of information technology operations at Midland Bank PLC in London, competition will lead to new service options, improved carrier performance and lower prices.

While users have profited from the limited competition between British Telecommunications PLC and Mercury Communications, Ltd. that commenced in 1984, White said they will benefit even further by having more carriers enter the market.

"It's been a little too easy for [British Telecom] up to now," he said.

This theme was emphasized by Sir Bryan Carsberg, director of the U.K.'s chief regulatory agency, the Office of Telecommunications, during a keynote address at the TMA event.

"There is a feeling that things are not as good as they could be," he said. "One thing we can do about that is have a more competitive market."

In many respects, the U.K. will be the most competitive market in the world — even exceeding the U.S. — because it will give foreign carriers unrestricted access to the market and allow full local-loop competition.

In a press conference following his speech, Carsberg added that U.K. firms might even benefit from the added competition. Because competition makes markets more efficient, greater competition could actually make U.K. suppliers stronger, he explained.

Even British Telecom Chairman Iain Vallance echoed this sentiment during a formal evening reception.

"We've got a great advantage [compared to carriers in other countries] in that we [will] operate under one of the least restrictive environments in the world," he said.

But users cautioned that even though the U.K.'s new network regulations will allow free competition, vigorous competition may never emerge.

This is because British Telecom is so dominant that it will take years, at best, for other carriers to build nets that rival British Telecom's in both reach and technical capability.

And carriers will be shooting at a moving target because British Telecom has enormous resources that can be applied to improve its network, said Adrian Squires, the TMA's public telephone operator liaison and assistant controller for information technology at The Rank Organisation PLC in London.

— *Barton Crockett*

Workers wage outsourcing war

continued from page 4

tionally strong human resource skills. It can easily be bungled," said Howard Anderson, managing director of The Yankee Group, a market research and consulting firm in Boston.

According to Trauger, NES could have avoided the lawsuit if it had taken pains to fully address employee concerns.

"NES handled the outsourcing decision horribly," Trauger said. "I'm confident that the employees would have reacted differently if [NES] had handled the situation better."

Trauger said NES officials didn't notify employees early enough about the outsourcing decision so they could find other jobs if they didn't want to work for Seltmann, Cobb. NES first announced its intention to outsource on Oct. 17.

Network Innovators

by Sharon Fisher

John Macri

From AT&T in the '40s to Bank of America in the '90s, Macri relates the changes he's seen in his 50 years in the telecom industry.

While Barbara Mandrell may sing that she was "country when country wasn't cool," John Macri can claim that he was telecom when telecom wasn't considered an important part of most companies, let alone a strategic asset.

Now vice-president and director of telecommunications acquisition and regulatory management at Bank of America National Trust & Savings Association in San Francisco, the 64-year-old Macri, whose career in the telecommunications industry spans almost 50 years, recalls that telecommunications managers didn't always enjoy the degree of respect they are now accorded.

"In the 1950s, we telecom-oriented people were treated like second-class citizens because the computer was [considered] omnipotent," Macri says. "You delivered things to it as to an altar. I can remember one computer guy I worked with who was planning manager of a new line of computers. When I asked him how he was architecting the memory, he told me it was none of my business."

> **"In the 1950s, we telecom-oriented people were treated like second-class citizens because the computer was [considered] omnipotent," Macri says. "You delivered things to it as to an altar."**

Macri's telecommunications career started in 1943, when, as a teenager, he began working as a craftsman at AT&T's New York switching center, installing telephone equipment and connections. After serving in World War II, Macri returned to AT&T, where he held a number of technical and commercial positions while earning a bachelor's degree in management and marketing from New York University.

In 1960, Macri joined the RCA Electronic Data Processing Division as manager of custom projects, focusing on the then-emerging need to integrate telecommunications with data processing. By 1977, he was RCA's vice-president of MIS and telecommunications, directing corporatewide telecommunications and computer systems planning, development and operations.

In the early 1980s, Macri held positions as manager of telecommunications and office systems at Digital Equipment Corp. and vice-president of telecommunications services at The Chase Manhattan Bank, N.A. before joining Bank of America in 1985.

Macri considers the integration of computer and telecommunications technology to be one of the biggest industry changes he's seen — and the one that produced modern telecommunications.

"In the early 1950s, I dealt with office managers who worried about chauffeured cars and office paper," Macri says. "All the major corporations had Telex operators and teletypewriter operators, but they didn't have a telecom department."

By the late 1950s, the job of telecommunications manager started to evolve, Macri says. "It became apparent that [companies] needed somebody to handle telecommunications." Macri soon found himself becoming a spokesman for telecommunications, "constantly pushing people to think about hiring somebody to do telecom on a full-time basis," he says.

"John taught me telecom," says DuWayne Peterson, an executive vice-president for Merrill Lynch & Company, Inc. in New York. This wouldn't have been unusual, except that Peterson was Macri's boss at the time, at RCA in the mid-1970s. "He taught me the value of having telecom managed as an entity across the corporation and its strategic value."

Of the social and technological changes he's seen in his 48-year career, Macri says the most dramatic change is the automation of the telephone system.

"When I went to work for AT&T in 1943, nobody, not even long-distance operators, could dial a long-distance call," Macri notes. "If [someone] wanted to make a call from Pasadena, Calif., to Scarsdale, N.Y., chances are that five operators would have had to handle that one call. The building in which I worked had 15,000 telephone operators.

"Today, nobody thinks for a minute about picking up the phone and dialing New Zealand," Macri continues. "You can dial 500 million telephones worldwide without the aid of an operator."

This technological breakthrough was necessary for a more pragmatic, social reason as well. "Just think for a moment — if we hadn't invented automated dialing and computer-aided dialing, every man, woman and child would be chained to a switchboard position," Macri says.

Regulation and deregulation

As was the case in a number of his former jobs, regulatory issues continue to be a major focus of Macri's work today. The most important milestone in this area, of course, was AT&T's divestiture in 1984. "The divestiture and deregulation forced large users to strengthen and build bigger telecom organizations because we believed that we would have to do more for ourselves," Macri says.

But while the focus of the AT&T divestiture was deregulation, a major trend has developed toward increasing regulation. "Major users like ourselves have had to appoint someone to be cognizant of what the FCC is doing, what the public utilities commission [PUC] in each of the states in which we operate is doing, and what the state and federal legislative systems are doing that would seriously impede our ability to continue to do business in the manner to which we'd become accustomed," Macri says.

Macri notes that although the regulatory initiatives some of these groups promote aren't necessarily restrictive, they can increase a user company's costs substantially.

For example, two years ago, the FCC considered increasing the access charges to value-added networks such as Tymnet and Telenet, Macri says — which could have doubled the cost of doing business for many companies.

When action by industry organizations wasn't successful, members of the industry initiated a letter-writing campaign to the FCC and Congress that eventually caused the FCC to withdraw that initiative.

Looking ahead

Macri said he believes that banks will continue to provide more information-related services to their customers, along the lines of automated teller machines and 24-hour checking information. "It's trite to say, but we're no longer in the money business — we're in the information business. Information is power, and it's paramount to our continued success," he says.

Although Bank of America has had its share of troubles in recent years, Macri notes that the bank turned a profit of $283 million for the third quarter of 1990. "Financially, we've recovered, and technically, we've recovered," he says.

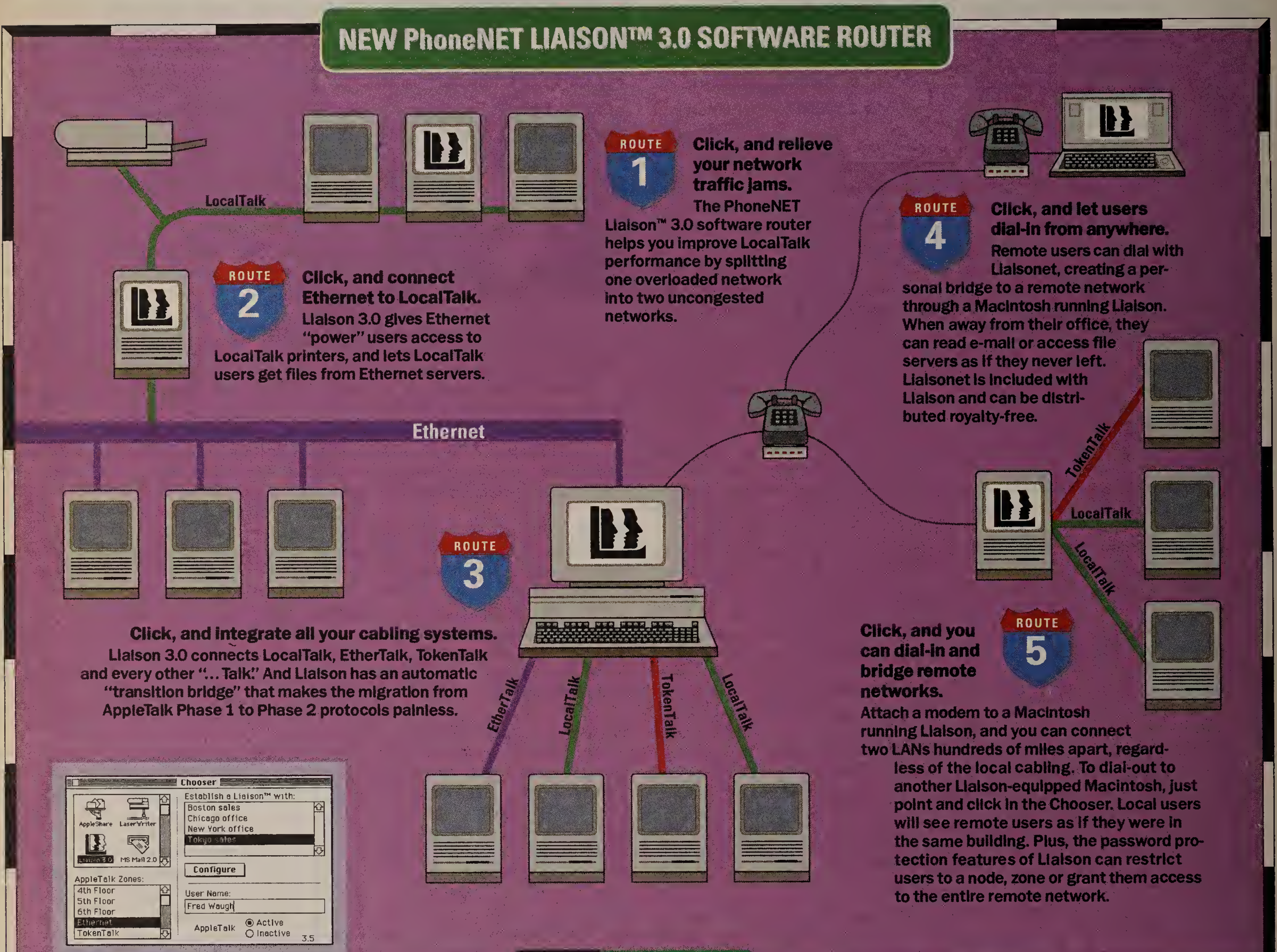
For example, at one point, Bank of America supported more than 70 data networks, Macri says. Now the bank is setting up a California data network, called the Customer Online Information Network, that will link more than 1,000 branches. "We're integrating these networks so that almost every data base in the bank can be accessed from a single terminal," Macri says.

It's quite clear that as far as telecommunications regulation is concerned, Macri believes that ignorance is most definitely not bliss. "All major industries should consider having someone concerning themselves with regulatory issues — and not just nationally," he says. "They should get involved with community issues and with the state PUCs by going to meetings and finding what they have on their dockets."

Macri seems to have imparted his devotion to telecommunications to his family. He proudly points out that three of his seven children — as well as two of his sons-in-law — are working in the telecommunications industry.

Fisher is a free-lance writer based in San Francisco.

Five reasons to take an alternate router.



ROUTE 1 **Click, and relieve your network traffic jams.** The PhoneNET Liaison™ 3.0 software router helps you improve LocalTalk performance by splitting one overloaded network into two uncongested networks.

ROUTE 2 **Click, and connect Ethernet to LocalTalk.** Liaison 3.0 gives Ethernet "power" users access to LocalTalk printers, and lets LocalTalk users get files from Ethernet servers.

ROUTE 3 **Click, and integrate all your cabling systems.** Liaison 3.0 connects LocalTalk, EtherTalk, TokenTalk and every other "... Talk." And Liaison has an automatic "transition bridge" that makes the migration from AppleTalk Phase 1 to Phase 2 protocols painless.

ROUTE 4 **Click, and let users dial-in from anywhere.** Remote users can dial with Liaisonet, creating a personal bridge to a remote network through a Macintosh running Liaison. When away from their office, they can read e-mail or access file servers as if they never left. Liaisonet is included with Liaison and can be distributed royalty-free.

ROUTE 5 **Click, and you can dial-in and bridge remote networks.** Attach a modem to a Macintosh running Liaison, and you can connect two LANs hundreds of miles apart, regardless of the local cabling. To dial-out to another Liaison-equipped Macintosh, just point and click in the Chooser. Local users will see remote users as if they were in the same building. Plus, the password protection features of Liaison can restrict users to a node, zone or grant them access to the entire remote network.

Chooser

Establish a Liaison™ with:
Boston sales
Chicago office
New York office
Tokyo sales

AppleTalk Zones:
4th Floor
5th Floor
6th Floor
Ethernet
TokenTalk

User Name: Fred Waugh

AppleTalk ● Active ○ Inactive

- Use any Macintosh as a router by running Liaison in the background
- Password protection, "hide" options and dial-back features
- Connects LocalTalk, EtherTalk and TokenTalk
- Supports AppleTalk Phase 1 and 2
- User-customizable script to support a wide range of modems and communication devices
- "Private use" feature lets Liaisonet users connect to a remote network without disconnecting from their own LAN

Liaison 3.0 is a valuable alternative to a hardware router because it's more flexible and easier to upgrade. Plus, you can configure Liaison 3.0 to run on any Macintosh. So take an alternate router by calling Customer Service at (415) 596-9000. Ask for a Liaison data sheet. Dealers call our Reseller Hotline at 1 (800) 344-7489 in U.S. and Canada.

Farallon®
The Personal Communications Company™

PhoneNET System™ 2000 Powell Street, Suite 600, Emeryville, CA USA 94608. FAX: (415) 596-9020. PhoneNET and the Farallon logo design are registered trademarks, and Farallon, the PhoneNET System logo design, and the Personal Communications Company are trademarks of Farallon Computing, Inc. AppleTalk and Macintosh are registered trademarks and LocalTalk, EtherTalk, TokenTalk and AppleShare are trademarks of Apple Computer, Inc. ©1990 Farallon Computing, Inc. All rights reserved.

See the FAXNeT Form on Page 58